

Fast Track *to*

OPEN SOURCE SOFTWARE

Open **Source**

Open **Audio**

Video

2D And 3D Graphics

System Tools

Office **Tools**

Networking And The Internet

Security

Educational Tools

Fun **Stuff**

Resources



Fast Track to Open Source Software

By Team Digit

Credits

The People Behind This Book

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Democracy In Software

For those of you new to the concept, open source software is that which is open to modification by the user, as opposed to closed source, where you only get an executable file and cannot modify it in any way. What model will prevail in this century is the subject of much analysis, and opinions abound.

So why would you want to modify the code of a program? It could be for testing one's programming skills, for enhancing the functionality of the software, just for the sheer fun of it, or — which is most often the case — to get involved in the community effort. You see, open source programs are usually ongoing projects; unlike a company coming out with a finished product, in the open source world, people collaborate and share. They listen to user requests. They listen to comments and reviews. In short, the entire computing experience is like one group effort.

In this book, we present the best and most popular open source programs available across various categories. The first chapter walks you through the basics of what the open source movement is all about. Then come chapters each devoted to a specific software segment — audio, video, and graphics manipulation programs, system and office tools, Internet-related software, security-related programs, and educational software. At the end, as is customary, we throw in a chapter on Internet resources — places on the Web to visit after having gone through the book.

Remember that the code of every program mentioned in this book is freely available for download. You can modify them and redistribute the software — subject to terms you'll learn about in the first chapter. For that, of course, you'll need some programming skills: if you already do, we encourage you to play around with the software and get back to us about it! And if you don't have programming experience, do look forward to future books in this series that could focus on programming.

Oh, did we forget to mention that all the software mentioned here are free of cost?

Enjoy!

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About Open Source



A typical Indian scenario: Munna's dad brings home a PC. He impatiently boots it up and is happy to see the OS load and present him with the Desktop. He quickly looks up the programs list and see the familiar office and graphics package and half a dozen games. He is thrilled.

Chances are you imagined the OS to be XP and the packages to be MS Office and Adobe Photoshop. All for free. And you wouldn't be alone.

1.1 The Indian PC Landscape

Officially, the percentage of Indians paying money for the software they use is about 25 per cent (www.thehindubusinessline.com/2006/03/30/stories/2006033003470400.htm). It is “normal” for Indians to pay for the PC hardware and expect it to come with all the required software. Either deliberately or due to ignorance, PC buyers pirate software and are for the most part unaware of the illegal nature of their actions.

While many argue that the price of licensed software is the main reason for piracy in India, this excuse cannot be used as a fig leaf by any self-respecting Indian. There are two ways to redeem ourselves: either pay for the software on the PC—and this could total up to almost the cost of the hardware—or turn to Open Source Software (OSS).

1.1.1 Why Is OSS Of Special Importance To India?

With a PC penetration of 1.4 per cent (www.zdnetindia.com/news/national/stories/366,121093.html), considering our population, thou-

Some Common Terms

Paid Software: Software that is bought for a fee

Free Software: Software that is available free of cost—also called freeware.

Source Code: The human readable text that is written in the syntax of the programming language and consists of the logic and commands of the program.

Compiler: A program that prepares a source code and converts it into machine-readable form.

Binary/Executable: This is created from the source code by compiling it. In this form, the program cannot be read by humans.

Open Source: Software whose source code is available

Closed Source: Software whose source code is not available

Proprietary Software: This would obviously mean a software that has a proprietor. But the term is usually used for paid, closed-source software. We shall continue in the same vein. The opposite would be free open source software or FOSS.

Commercial Software: Commercial Software, for the purpose of this chapter as well as logically, means software used in commercial enterprises. But the term is also used for closed source, paid software. Non-commercial software usually applies to software used for not-for-profit purposes and personal use.

Vendor: For brevity, vendor refers to the software creator/owner and seller.

sands of Indians are being introduced to the PC every day. By exposing first-time users to OSS, they can be free from the monetary hassles of Proprietary Software (PS)—or the legal implications of pirating it, as we said. Additionally, besides reducing the total cost of the PC, OSS also allows customisation to suit the needs of every linguistic group in every state of India. Altering the user interface to the local language will greatly increase acceptance of the PC.

While OSS can be modified using local expertise (with or without government funding, since it is for social benefit), PS alterations need to be done by the vendor, which is usually influenced by economic considerations, like the size of the market. If a native of Assam needs to appreciate the power of the PC, the interface needs to be in Assamese. Given the small size of that population, the chances that PS will be available in the local language are very slim. But an OSS can be modified by locals to suit their needs.

Before we continue further, the following terms need to be clarified.

1.2 The Open Source Movement

1.2.1 What Is OSS ?

OSS literally means software whose source is open. Stretching this definition, to be termed OSS, the software should also not restrict the user from freely using it, modifying it and distributing it. The most significant differences between OSS and Proprietary Software (PS) are immediately apparent. PS is usually distributed as a binary without the source code. So it is almost impossible to dissect the program to learn about its structure and logic, and make corrections or modifications if necessary. PSS is normally sold with a lot of conditions that restrict the usage and distribution of the program.

1.2.2 What OSS Isn't

There is a general opinion that all OSS is also free of cost. That isn't the case. Proponents of OSS do not restrict the sale of the OSS. People are free to package and sell OSS at a price they consider fit.

But given the fact that the OSS is freely available to the next person as well, it is easy to conclude that it would not be possible for an arbitrarily high price to sustain. If the price is too high, other vendors will enter the market and sell the same product cheaper. Thus, market forces will ensure that only a fair price is charged.

1.2.3 A Look At Both Types Of Software

1. Longevity

OSS, since it allows modification by all, can survive in its current form for a long time. Users need not worry about the lack of vendor support or feel compelled to upgrade. PS is supported and maintained only by the vendor, so the life of a software is linked to that of its vendor. Commercial organisations, while choosing a PS, cannot consider the performance of the program in isolation: they also have to consider the financial foundations and long-term business viability of the vendor. A user would be left in the lurch if the vendor were to close down in the near future.

2 Quality

Peer review, an excellent mechanism for identifying and resolving shortcomings in a product, can be implemented in OSS since anyone can see the code. The greater the number of people scrutinising the code, the greater the chances of bugs being discovered. In contrast, PS code is usually offered for review only to a select group, so peer review is not as rigorous. The resulting code, therefore is not as bug free as OSS. For example, experts have found that Linux has fewer bugs than Windows. (http://news.com.com/Security+research+suggests+Linux+has+fewer+flaws/2100-1002_3-5489804.html)

3. Portability

While the PC is the dominant computing platform, other computing devices are becoming popular. It is easy for an OSS to be ported to other platforms, since contributors with the relevant expertise can make necessary modifications. A PS vendor's expertise is limited to the platform it is currently serving; porting to other platforms would be influenced by many factors such as profitability.

4. Compatibility

The contributory nature of OSS requires that standards and specifications be open so that additions and/or modifications can be easily made. Business sense dictates that product differentiation is a good strategy leading to incompatible products from different PS vendors. A user planning to switch between different PS vendors needs to consider the cost of converting existing data from the older format to the newer one. This forces users to ignore better software, and acts as an artificial barrier to competition.

5. Impact of Negative Business Practices

OSS products can be supported by any person with required expertise; this can be from any service provider. PS can be supported only by a single entity. This allows the vendor to indulge in practices that could harm the user in the long term—like offering a PS for free to drive out competition, and later increasing prices.

6. Response time

Only the PS vendor can modify the code in response to an attack or to add a feature; users have to wait till such an event. OSS is enriched by newer features contributed by many programmers. The decentralised nature of the OSS development allows for faster incremental changes to OSS. Users with specific needs can customise the software either personally or with the aid of any knowledgeable person.

1.2.4 The forces behind the Open Source movement

Three entities are central to this movement : Richard Stallman, Linus Torvalds, and the Open Source Initiative. Richard Stallman is the original ideologue of the movement who started off to create an entire free OS—GNU. He also founded the Free Software Foundation. Linus Torvalds is the programmer who created the kernel—a central part of an operating system—that completed Stallman's GNU. And the Open Source Initiative, formed by Eric Raymond and Bruce Perens after having disagreed with Stallman's strict interpretation of free software, is responsible for having taken the movement to the masses, albeit by diluting the original ideology. How these three entities changed the software landscape is a gripping tale.

1.3 History

1.3.1 Richard Stallman

The 1960s were a time when computers were too expensive to be afforded by individuals, and computer users had to be programmers. In those days, computer manufacturers bundled along the code for the operating system because this allowed users to solve most of the problems that arose due to the lacunae in the OS, thus saving the manufacturer's the bother.



It was normal for users to modify code to extend the capabilities of the OS, like in response to newer situations or requirements. And such modifications were passed on to other users who were in similar situations. The concept of open source did not originate then because it was a given, and sharing and distributing code was natural.

By the 1970s, OS manufacturers had started de-bundling the code from the software. Moreover, users were subject to conditions that prevented the sharing of the program. Programmers themselves were subject to non-disclosure agreements so that they would not reveal the source code publicly.

Richard Stallman, then working at the AI lab at MIT, confronted a peculiar situation (which is common now). A printer that was given to the MIT lab by Xerox frequently jammed. He intended to modify the printer driver so that rather than continue to accept print jobs, it would send a message to the connected computer that it had jammed. Xerox refused to provide the driver's source code. A person who had worked at Xerox creating the driver refused to reveal the source code since he had signed a non-disclosure agreement.

In many ways, the incident with the printer and the driver can be seen as the starting point of the OSS movement.

Stallman, who had considered software merely as a source of information to be shared between people, was worried that the measures put up by vendors would make the life of users difficult, by depriving them of the freedom of usage.

1.3.2 GNU, GPL and Free Software Foundation

Stallman's response to PS was the GNU (a recursive abbreviation for "GNU's Not UNIX"). It was intended to be a free operating system, which came with the source code. Since most programmers were comfortable with Unix, GNU set out to be a Unix clone. Stallman received the collaboration of other volunteer programmers for the project. That was in 1983. While Stallman referred to GNU as a "free" OS intending it to mean "freedom of choice (use, modify and distribute)" to the user, people mistook "free" to be "free of cost." This confusion proved disastrous to the movement, leading to the branching out of the OSI.

The GPL or General Public License was a licensing scheme devised by Stallman to ensure that programs released under that license remained free perpetually. Copyrighted software was the property of the copyright holder. If a copyright expired, the software would be placed in the public domain for anyone to use. Here the program can be included in other proprietary software and be lost to the public. A software licensed under the GPL (also called "copyleft") remained free because not only was the software free, but also every program that utilised a GPL software in turn was automatically copylefted.

The Free Software Foundation (FSF) was created in 1984 to ensure a source of funding for the GNU project. The Indian Affiliate of FSF, FSF India, was set up in Kerala in 2001 and inaugurated by Stallman.

1.3.3 Linus Torvalds

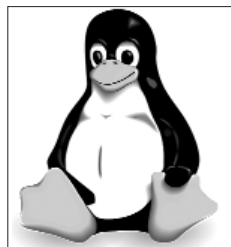
Torvalds was a computer science student at the University of Helsinki when he came across the Minix operating system. Minix was open source in that the 12,000 lines of code were given in a

textbook by the creator and author of the book Prof Andy Tanenbaum. Linus intended to improve on Minix, but he was denied permission by the Professor. So, as a hobby, Linus decided to create a free OS. Like Stallman before him, Torvalds sought volunteers for the project by using the Net. The term Linux arose because that was the name of the folder in which the source code of the kernel was made available on the Net, Linus' own preferred name for the kernel was "Freax". Linus' MSc Thesis was titled "Linux : A Portable OS".



1.3.4 GNU/LINUX

By 1990, the GNU project had most of the parts of the OS ready—the libraries, the compiler, the shell, text editors etc. The critical component missing was a kernel. Their attempts to create a kernel, called the HURD, were facing delays. By 1991, the kernel Torvalds and other members were working on was ready. Seeing that the GNU OS was complete in all respects except for the kernel, Torvalds ported his kernel to work with the rest of the GNU system. The result was GNU/Linux. Of course, that was not what it was called. The complete OS took on the name of the kernel and quickly spread as "Linux." It is therefore incorrect to call the entire OS "Linux," especially since the kernel constitutes merely eight per cent of the entire OS, while the GNU components account for about 25 per cent.

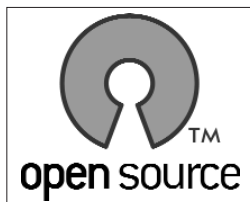


Ever since the complete OS became ready, due to its "Unix-ness," it found acceptance in commercial applications where proprietary Unix was being used. Very soon, GNU/Linux became the most popular Unix flavour, surpassing other proprietary flavours such as AIX from IBM and HP-UX from HP.

The usage of only the term “Linux” for the OS led to significant diversions from the GNU ideology of freedom. As GNU remained segregated from Linux, the founding force behind the OS remained obscure. This led to some disturbing trends. While Stallman intended the OS to be completely free, many GNU/Linux distributions overlooked this criterion.

1.3.5 The Open Source Initiative (OSI)

The OSI was created in 1998 by Eric Raymond and Bruce Perens, since they did not agree to the restrictions imposed by Stallman’s ideology of free (“free” as in freedom) software. While Stallman’s GPL required that every application bundled with a GPL software be GPL-ed, the OSI felt this would decrease the practicality of the product. The OSI allowed a more liberal form of licensing called the OSL or Open Source License, which assuaged the fears that proprietary software vendors had with the GPL. This allowed a hybrid mix of open source and closed source software to power most present GNU/Linux distros. Needless to say, that move has greatly increased the spread of the OS.



For example, the original GNU/Linux OS was text-based and worked off the command line. To be able to add a GUI to the OS it was necessary to include a windowing system. Such a system, called X Windows (or X11) was being developed by an organisation called the X Consortium. Being a closed source program, it was not possible to use it under the GPL. But being more liberal, the OSI license allowed the usage of the X Windows program with the other GPL programs in the GNU/Linux package. The direct result has been the greater acceptability of GNU/Linux on the Desktop, since most distros came bundled with a GUI. This has greatly contributed to the popularity of GNU/Linux among non-commercial users. While the original X11 was closed source, it was later on made open source and renamed Xfree86.

1.4 The Future

1.4.1 Proprietary Software

According to Stallman, fixing a software should not be seen as different from fixing a water tap. Ordinary people should be able to do it with little effort. The OSS movement has ensured that users will be more aware of the pitfalls of using proprietary software, whether free or not. With OSS, ordinary people can collaborate and share software with others without feeling guilty or being labelled a pirate or being paranoid about being penalised. Using OSS will ensure that the general awareness among users will increase, since they will be able to identify and debug code without waiting to be spoon-fed by a vendor.

1.4.2 GNU/LINUX

The GNU Project is continuing to work on the HURD kernel to complete the GNU OS. But whether it will gain the wide acceptance that GNU/Linux has is anybody's guess. Nevertheless, given the inherent advantages of an OSS, compatibility and price will not be issues.

1.4.3 The personal Desktop arena

Unlike commercial usage, where stability is more important than a slick GUI, the non-commercial PC requires greater user-friendliness and a greater variety of entertainment software like games. OSS games are presently few and far between. Many OSS programs have been made available for proprietary OSes. The first step to accepting OSS is to switch to these applications.

1.5 Concluding Remarks

For a country like India, where on the one hand many are turning to PCs for the first time, and on the other hand many programmers are raking in a lot of foreign exchange, the decision to go either way can be difficult. Since most programmers are working on proprietary software, the decision to go with OSS will impact their long-term prospects. Delaying the acceptance of OSS by continuing to rely on proprietary software, pirated or otherwise, will negatively impact our ability to remain independent of the whims of a vendor.

Comparable OSS programs

Application Area	Propreitary	OS
Office Applications	MS Office	Openoffice.org
Graphics Editing	Adobe Photoshop	The GIMP
Desktop Publishing	Adobe Pagemaker	Scribus
SVG Editor	Corel Draw	Inkscape
Media Players	Windows Media Player, Winamp, Power DVD	Media Player Classic, VLC Media Player
Video Editors, Encoders	WinAvi, Imtoo	VirtualDub, Mediacoder

The OSS movement views software as a mundane item like a car: in real life, users can freely share information about the car, its engine specs, etc. In much the same vein, the role of the software is relegated as an accessory a to the hardware. Users pay for the hardware and get the required software for free. Any additional tweaking or troubleshooting should be carried out by the user, or by an expert who is paid by the user.

1.6 SourceForge

What is SourceForge?

For those uninitiated or new to the open source movement, SourceForge (<http://www.sourceforge.net>) is one of largest open source development site on the net. It claims to host more than 100,000 projects and has over 1,000,000 users registered with it. Its growing popularity is testament to the success of the Open Source Movement and the site itself carries forward the definition by providing an open, collaborative environment. Users here can pitch in with their efforts, and more importantly, share their technological know-how to make advanced, useful and bug free code.

This site is owned by OSTG (the Open Source Technology Group), Inc which also owns other popular sites like linux.com, ThinkGeek and DevChannel.

1.6.1 The First Step

1.6.1.1 Getting started

The site itself is uncomplicated and manages be informative and feature filled, yet at the same time simple and easy to navigate.

Things, however, start to get just a little complicated as soon as you click on the create account link.

1.6.1.2 Registering your account

The first page itself is very simple and all you need to do is fill in your email address and password. Make sure that you fill in the correct email address as you will require it later.

Now starts the nagging-nanny routine and you're asked to verify your email. It's better to get used to this treatment because it does tend to get a little irritating as you move further into the process.

Next you have to enter details like your account name and your public display name along with certain other details. On clicking

next, be prepared to see the nagging nanny screen again!

And again...(don't say we didn't warn you!)

Now that your account is ready, you can start off with the project creation.

1.6.2 Project Creation

1.6.2.1 The First Step

Logging in for the first time, you might be a little surprised to see what you think is the registration process starting all over again. It's basically a formality that needs to be completed before you can move on.

The next step involves the ~Open Source Definition~. You have to agree to its terms before you're allowed to go forward. Make sure that you read it properly and understand all its terms. It might be a good idea to take a printout and keep it for later reference.

You are then greeted by a screen which asks you to select the Project Type. It gives you various options which you can select based on the type of project that you plan to create on the site.

After selecting your project type you have to again agree to a separate 'terms and conditions of use'. It's again a good idea to read the agreement carefully and scrutinize all the terms carefully, due to its legal nature. Make sure you are well aware of the conditions before clicking 'I Agree'.

Which brings us now to the hosting requirements. This is basically a guideline that you, as the user, are supposed to adhere to. The last few paragraphs regarding the open source/rights to code make for an interesting read.

The next page is the Trove Categorization page. This means that this page is meant mainly to categorize the project properly so as

to ensure that it can be easily accessible to users searching for it and other similar projects. Various fields with comprehensive lists are also provided. These fields include license, intended audience, database environment, programming language, user interface, translations, topics and operating system.

If you are making any custom exception/modifications to the license agreement it is important to add others in the license field and then mentioning the new clauses in the resulting field as you are allowed to do so only here.

The next step involves filling in a small textual description of the project which will be seen by other users. Since this is what the user will see initially, make sure that it's catchy as well as informative. Think of it as an advertisement and let your creative juices flow!

Now comes the serious part. In this page you are supposed to type in the full textual, technical description of your project. Read the text carefully as it mentions a few important points. The first is that this is not a text that would be available to the public so don't be afraid that your ideas will be stolen (at least not from here!). Secondly this description along with your initial trove categorization will be the basis for approval or rejection of permission for hosting on Sourceforge.net.

The next and penultimate step (finally!) is the project descriptive name which is what it would be popularly know as and what the people would know it by.

The last step involves the formalities of checking the accuracy and corrections that are needed as per your requirements.

1.6.3 Project Maintenance and Services

SourceForge provides an assortment of very useful services to the users using its site for project development. Some of these are listed below.

1.6.3.1 Compile Farm

The Compile Farm gives developers access to a number of different hosts that may be used for the compiling and testing of the code. These hosts all use different operating systems and hardware platforms. Currently there are 12 hosts running 6 different operating systems and 5 different hardware profiles. More information can be found on https://sourceforge.net/docs/compile_farm

1.6.3.2 CVS (Concurrent Versioning System)

The site also provides a CVS (Concurrent Versioning System) which allows you to centrally store your code. You are also provided with your own CVS space called a Repository. This helps users retrieve the latest source code and at the same time provides the developers a space to upload their modified code. The advantage is that it prevents developers from overwriting changes made by others. The CVS also keeps track of all the changes that are made to the code and by whom. On the same lines, you can also use ~Subversion~.

1.6.3.3 Publicity

Another huge advantage of hosting a project on this site is the publicity and exposure that it is bound to get. The searchable database as well as the monthly showcase of the 'Software Of The Month' goes a long way in highlighting certain projects. News items regarding some projects are also displayed on the front page through RSS feeds.

1.6.3.4 The Extras

Various other services and tools like trackers, forums, file release system, a donation system and a decent 100MB of space for web content and scripts make it an excellent choice for all you developers out there.

Open Audio



For a lot of us, Audio is a very important aspect of computing—not just listening, but also editing or creating it. The open source community has developed applications with the same enthusiasm that we exhibit when listening to or creating music. This chapter will try and identify all the coolest audio-related projects out there.

2.1 Formats/Codecs

The very first thing we come across when dealing with digital audio (or even video) are formats and codecs. The open source community, as one might expect, has its own fair share of lossless and lossy audio codecs and formats for audio. And frankly speaking, they're pretty good alternatives to the more popular and closed source MP3 and WMA formats.

2.1.1 Ogg Vorbis

www.vorbis.com

Perhaps the most popular open source audio container, Ogg Vorbis files have the .ogg extension. Most media players today can play this format, and it being open source, even if your media player does not natively support this format, you can still download the requisite codecs and play .ogg files.

Unlike other patented formats such as MP3 or AAC, Ogg Vorbis is completely free. First we should tell you that Ogg is a container format, such as MP3 or AAC, and was developed by Xiph.org. Vorbis is the compression algorithm, and Xiph.org is the open source community/project that developed and now maintains the Ogg Vorbis format.

Xiph is short for *Xiphophorus helleri*, a tiny aquarium fish that is also known as a swordtail. There's no particular connection to the fish, except that the founder liked the name. The name was shortened to Xiph (pronounced *zif*).

The Ogg project was originally called "Squish," as in "a bug hit my windscreen and was *squished*." Until Xiph was informed that a mail transport company owned the trademark. At the time, a network game called *Netrek* was popular, and Xiph borrowed the name for a tactical manoeuvre—Og!

From an archived Internet page: "In the multi-player space combat game *Netrek*, to execute kamikaze attacks against

enemy ships which are carrying armies or occupying strategic positions. Named during a game in which one of the players repeatedly used the tactic while playing Orion ship G, showing up in the player list as ‘Og’.” So basically, the term Og, or Ogg, means to force an action, without worrying much about the future or the losses suffered.

What does Ogg have to do with audio compression? Well, quite simply, the encoding process was so taxing on the computers of those days that if you started *Ogging* a song, you could pretty much forget about doing anything else, because the processor was too bogged down.

Vorbis is Xiph’s “audio compression scheme” (read: algorithm), which is contained in an Ogg container. If the word “container” confuses you, think of it as a box in which packaged goods are sent. So, the Ogg container can contain audio in the FLAC or the Speex formats, apart from Vorbis, obviously.

Ogg Vorbis is generally considered a much better compression format than MP3, and is comparable (if not better in some cases) to WMA or AAC. Files compressed using Vorbis are smaller than their MP3 counterparts of comparable audio quality, which translates to better distribution in the streaming form over the Net. Also, because it is completely open source and free, artists who use this format to sell music never have to pay any royalties to anyone for using the format. For example, if you sell music in the MP3 format, you have to pay a small percentage of your earnings to Fraunhofer, who own the patents to much of the technology underlying that format.

Also, for those with large collections of 192 or 320 Kbps MP3s, a huge disk space saving lies in store if you convert all your files to 128 Kbps Ogg Vorbis files. Everyone claims better quality of sound for 128 Kbps Oggs than 192 Kbps MP3s!

2.1.2 FLAC

flac.sourceforge.net

FLAC, or Free Lossless Audio Codec, is another open source audio codec, but unlike MP3, Vorbis or others, it's lossless compression. This means you can rip CD audio without losing any data or quality whatsoever.

Let's quickly explain the term lossless compression: the simplest example is when you use WinZip or WinRAR to compress a file or multiple files: you can get back the original files when you decompress the archive, without losing any data whatsoever. Similarly, when you use lossless codecs such as FLAC, none of the digital data is lost—it's like zipping a CD audio file and then unzipping it during playback.

FLAC is an open source project that can be found at SourceForge.net. It can be used to compress (in a lossless way) audio, and used with the Ogg container to give you Ogg FLAC—or FLAC-encoded Ogg files.

In order to illustrate this, think of an audio file as consisting of two layers: the inner layer is the uncompressed digital audio data (FLAC-encoded audio), while the outer layer is the holder or “container” of this data. The container is what holds the audio data, broken and arranged into smaller parts, which allows you to seek (move the slider) through the song, or even for editing.

The advantage of using FLAC to encode your collection is that it is quite fast, both when encoding and decoding, and is natively seekable and streamable, so you don't really need a container like Ogg (unless you want to use your files with a portable music player that supports Ogg).

Overall, FLAC is good for audiophiles who want CD-quality data wherever they go. For most of us though, lossy formats such as MP3 and Ogg should do just fine. After all, most of us want compressed music to fit onto our portable media devices or cell

phones, so that we can listen to audio on the move, which is hardly optimum listening—the sights and sounds of the environment will cause you to never know the difference between the audio quality of your Discman and MP3 player.

2.1.3 LAME

lame.sourceforge.net / www.mp3dev.org

LAME, a recursive acronym for “LAME Ain’t an MP3 Encoder,” is perhaps the most popular of audio codecs. It is used with the MP3 container, and is what the majority of software applications use for ripping CDs. If you’ve ever taken some of your CDs, popped them into the PC and used the “Rip” option that’s available in players such as Winamp, or conversion software such as dBpowerAMP, you have used the LAME encoder!

LAME uses a lossy algorithm to compress audio, mainly for streaming purposes and portable music players. With MP3s becoming the de-facto standard of compressed digital audio, and portable music players being renamed “MP3” players, LAME has gained even more popularity. This can also be attributed to the fact that it’s open source, as compared to Fraunhofer’s l3enc MP3 encoder patent.

If you’ve read this far, and are a little confused about MP3 and all the mentions of patented and open source MP3 encoders, join the club! There’s so much grey area in this weird battle, no-one seems to know what about MP3 is patented, and what isn’t. Let’s digress for a bit to tell you a little story of patent stupidity.

In September 2006, at the IFA trade fair in Berlin, SanDisk’s booth was raided by the German police, and all their MP3 players were confiscated: a case filed by the firm Sisvel, which sells MP3 playability licenses (which, in turn, it licensed from Philips) to companies that make MP3 players, claimed that SanDisk owed it money for failure to buy a license to incorporate the MP3 playback feature in their devices. On the same day that SanDisk filed an appeal, and won, Sisvel got the public prosecutor to file a case in

the same court (different judge) and won! So, while German officials go bald from scratching their heads wondering which ruling to uphold, you can stop worrying about being confused about this patent thing! Quite apparently, the lawmakers themselves are just as confused—if not more so!

Want some good news? Fraunhofer's patents will expire in April 2010, after which all MP3 algorithms become public domain! So all you need to do is deal with all the confusion for a little over three years more...

Now, back to LAME! As far as comparisons to Ogg Vorbis, AAC and WMA go, the LAME encoder is found to be seriously lacking. However, because of the popularity of the MP3 format, and the wide acceptance with a majority of audio players (from your TV-top DVD player to your cell phone and even your car audio systems), most of us gladly overlook the compromise on quality and file sizes. Microsoft, meanwhile, has been aggressively pushing its own Windows Media format (WMA/WMV), which has resulted in a lot of devices being both WMA- and MP3-capable. Though Windows Media is free from MP3's patent woes, it isn't open source like LAME.

2.1.4 Speex

www.speex.org

Another product of Xiph.org, Speex is sort of the Ogg Vorbis answer to speech compression. Unlike music, speech is a lot simpler, and requires much lower bitrates to be aurally readable. As a result, it is only natural that a different set of algorithms than the ones used for music can compress speech a lot better.

Speex is open source, and can be added to the Ogg container. It uses a variable bitrate encoding process to provide the best possible quality in combination with the best compression ratio. It was developed mainly for VoIP, and uses a unique packet loss concealment technology that masks dropped UDP packets, to prevent crackling and breaking of voice data.

Though there are a few more open source audio compression technologies out there, the ones mentioned above are the most popular. It's time now to look at some software audio players.

2.2 Players

Though a lot of us are quite happy with players such as Winamp or Windows Media Player, some of us prefer the flexibility that accompanies the use of open source players. If you know your coding, you could actually customise and improve some of the players we will list below.

2.2.1 MPlayer

www.mplayerhq.hu

From the site: "MPlayer is a movie player which runs on many systems. It plays most MPEG/VOB, AVI, Ogg/OGM, VIVO, ASF/WMA/WMV, QT/MOV/MP4, RealMedia, Matroska, NUT, NupelVideo, FLI, YUV4MPEG, FILM, RoQ, PVA files, supported by many native, XAnim, and Win32 DLL codecs. You can watch VideoCD, SVCD, DVD, 3ivx, DivX 3/4/5 and even WMV movies."

That pretty much says it all as far as MPlayer's capabilities go. Now let's look at the actual experience. You can download a beta GUI version from the site, unless you just want to be the ultimate geek and use the command line version!

We're going to talk about the "experimental Windows GUI build" here, because, honestly, if we expect you to stop using players such as Winamp and WMP, which are known for their ease of use, and try out MPlayer, we'd rather you didn't struggle at a command prompt!

You can get various skins from the MPlayer site, and also from <http://themes.freshmeat.net/search/?q=mplayer§ion=projects>.

Overall, MPlayer is a decent open source media player, with all the basic functionality that's expected of it. You can read more about its video capabilities in the chapter that's coming up next.



MPlayer starts up with a nice blue GUI that rivals any other player

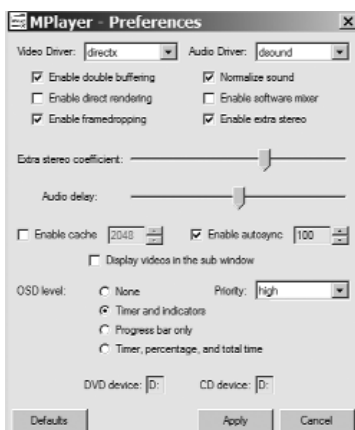


MPlayer playing out a test VCD, with the display equaliser

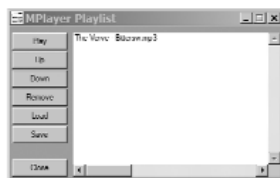
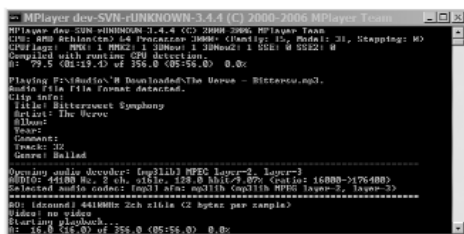
2.2.2 Zinf

www.zinf.org

Zinf is an open source audio player that is built for both Linux and Windows. The player has a good-looking interface and is really easy to use. It was a project that was based on FreeAMP, the open source answer to Winamp. You can get a whole range of themes from www.zinf.org/themes.php. It also supports SHOUTcast or Icecast streaming audio, Ogg Vorbis, MP3, WAV, Audio CDs, PLS or M3U



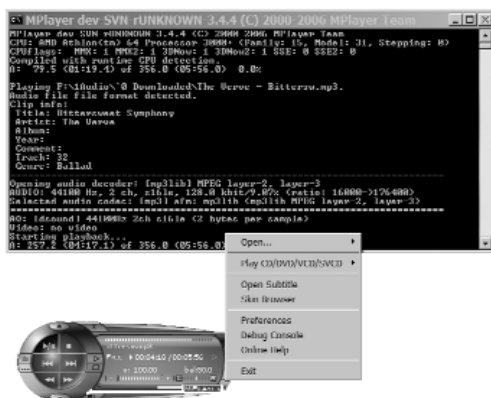
MPlayer configurations



MPlayer has a playlist and commandline debug option as well

playlists, a skinnable interface, and more. It does not play video, so forget about it if you're looking for a complete media player.

One of its best features is the fact that it can save SHOUTcast/Icecast streams to your hard drive. Of course you need to make sure you're not breaking any laws by doing so, but you can save free streams with no license limitations—and with SHOUTcast, you're



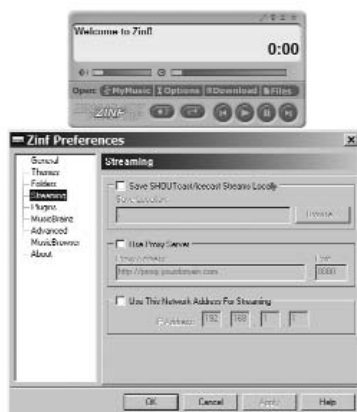
MPlayer right-click options will give you all the info you need

not going to have any trouble finding such streams.

One bad thing is that it does not have an equaliser, which is good for those who really want to hear their music as-is, but terrible for those who like to tweak the output settings.

Overall, if you're looking for a no-frills player, which uses as little of your system resources as possible, and gives you all the basic functionality you need when playing back audio, this is your best bet. The minimum system requirements should make those with older computers very happy:

Windows 95/98/NT/2000/XP,
Linux 2.x, Pentium 100
MHz, 32 MB RAM



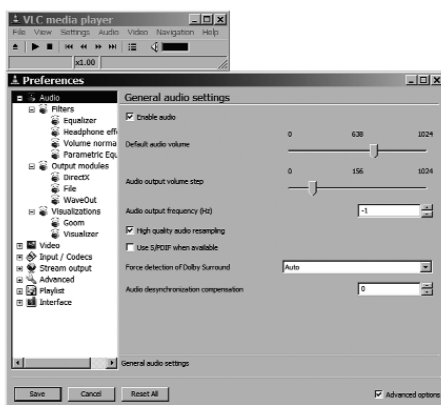
One of Zinf's best features is the ability to record from SHOUTcast streams

2.2.3 VLC Media Player

www.videolan.org

VLC Media Player (earlier called VideoLAN Client) is one of the most popular open source media players. Though more popular for its video playing capabilities, it's also a very good audio player, with tons of options and features. It natively supports MPEG 1 and 2, MP3, AAC, Ogg Vorbis, WMA, FLAC, Real Audio (RA), Speex, QuickTime, and more.

Apart from playlists and other standard player functionality, it also offers a whole range of additional audio features and options. As far as we're concerned, it's an essential tool that everyone should have, so we'll just let you install it from the Essentials section in our CD, and then have a look at the features it offers for yourself. You can also read more about VLC Media Player in the Video section of this book.



VLC Media Player has a tonne of audio options to help you get that perfect sound

2.3 Editors

Not a lot of us need to edit audio, but those of us that do are in desperate need of audio editing software. Let's look at open source editing software.

2.2.1 Audacity

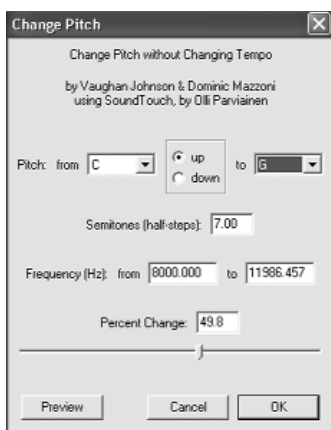
<http://audacity.sourceforge.net>

Audacity is perhaps the most popular free music editor, and the fact that it's open source means that there's a ton of support available in the form of forums and developers.

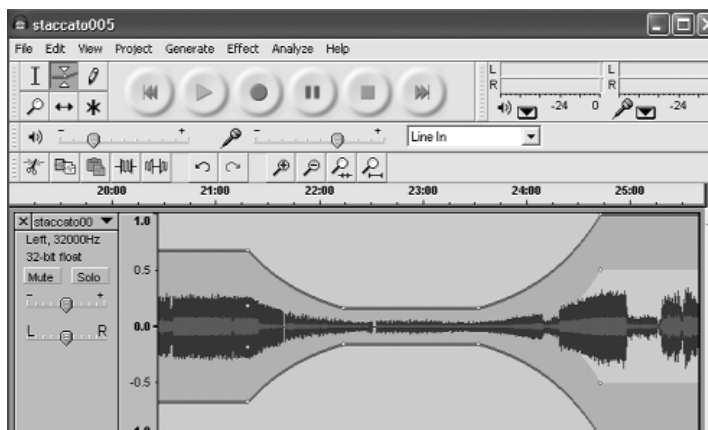
You can use Audacity to record audio from any input source, edit MP3/WAV/Ogg Vorbis files, split and splice audio clips together, change the speed or pitch of audio, mix tracks, record multi-channel (up to 16 channels—with the right hardware), normalise and edit loudness, and much more.

You can undo / redo your changes an unlimited amount of steps; it's fast, low on system resources, and has a very easy-to-use interface. Effects include pitch changing without altering tempo, or changing tempo without altering pitch, static removal, bass boost, equalisers, echo, Wahwah, Phasers, and more.

If there's an audio file you want to change, or a mix you want to create, forget about paying for software, or even the other freeware options you may find—just use Audacity. Everyone but the most professional editors should find that there's nothing they need to do (in terms of audio editing) that Audacity cannot do for you, either natively or using



Use Audacity to change pitch without changing tempo – to illustrate, it's like the speed control settings in Windows Media Player



The Audacity interface is easy to use and get used to

one of the many plugins that are developed by the Audacity community.

We're not even going to look at the other open source attempts at audio editors, only because none are even half as good as Audacity!

2.4 dyne:bolic

www.dynebolic.org

This is actually an entire Linux distro that's targeted at the multimedia enthusiast. You will soon see why this distro has a mention of its own.

"dyne:bolic is shaped on the needs of media activists, artists and creatives as a practical tool for multimedia production: you can manipulate and broadcast both sound and video with tools to record, edit, encode and stream, having automatically recognized most device and peripherals: audio, video, TV, network cards, FireWire, USB and more; all using only free software!"

Basically, it's a Live CD of a distro that bundles in a lot of open source multimedia software. The reason we haven't mentioned any

Linux-based audio software thus far in this chapter is solely because of dyne:bolic. Actually, some of the software mentioned above come bundled with this distro, but since there are Windows versions of those, we decided to mention them anyway.

The good news for those of you who did not really want to switch operating systems, just to use the “Linux-only” open source audio packages that are freely available, is that you no longer need to do so. All you have to do is download the ISO for this distro, burn it to a CD, and then get started using your favourite open source audio (video, image and 3D as well) software.

Take a look at the audio software bundled along with dyne:bolic (as published on their site).

Play Audio

Xmms: An audio player with a minimal and intuitive playlist manager that can play Internet streams and local files and can be skinned or customised with plugins.

Amarok: A fully-featured personal jukebox that can handle your audio collection, automatically download labels and lyrics, search your collection by keywords, remember your preferences, automatically create favourite playlists, and more.

Timidity: A midi synthesizer that uses GUS patches to render your MIDI files into audio files, as well as make you listen to MIDI partitures.

Perform

Hydrogen: A drum-machine that lets you load sample kits of instruments and compose a partiture for them to play on a specific rhythm. You can download more drum kits for it from www.hydrogen-music.org.

Jamin: The Jack audio mastering interface can perform professional audio mastering of any stereo input stream, equalising signals with an intuitive and advanced interface to shape all frequencies in real-time.

Jack Rack: A powerful effect rack that can apply chains of audio plugins (LADSPA) on the sound currently being played by other programs. Using Jack, you can interface it with all other performance tools and add one of the more than 200 effects available in *dyne:bolic*.

FreeWheeling: A funky application that lets you record and play multiple samples in real-time, so that they loop, and can be overlaid one after the other. You can manipulate, sum and create recorded sounds, but make sure you read the manual before you start using it, because it's all controlled via keyboard (or midi).

Editing

Ardour: The fully-featured multi-track studio that offers the most advanced interface for your music recording studio. Combined with other applications (such as Jack), it can really solve all your needs for audio mastering and music production.

Audacity: Read about Audacity earlier in this chapter.

Rezound: A sample editor that lets you manipulate (with precision) your music samples, record, loop and apply effects using an intuitive and complete interface.

TimeMachine: A simple tool for recording audio, requiring Jack as a sound engine. It is, quite simply, a big red button: press it, and it starts recording from 10 seconds ago! This is so that you can record what you find interesting in an audio input, just by listening, without needing to rewind to start recording again.

Stream

MuSE: A software that lets you stream audio on the Internet over various servers (Icecast, Darwin, and Shoutcast) in MP3 or OGG format, so that listeners will be able to listen to your voice and music using the most commonly available sound players around. Visit <http://muse.dyne.org>, or <http://flossmanuals.org/muse> for a lot more documentation on how to use this cool software.

Here's a list of other bundled apps:

- Mp4Live lets you stream mpeg4 audio and video on a Darwin server
- HasciiCam, to have a cool (h)ascii webcam, also on low bandwidth
- TerminatorX, GDam, SoundTracker and PD, to perform with live audio
- Kino, Cinelerra and LiVES, to edit video and publish clips
- GIMP, the GNU image manipulation program
- Blender, a powerful 3D modelling and rendering tools
- AbiWord and Ted, to read, edit, and save any kind of word files
- GComburn, to easily burn data on CDs

...And much more, including games, e-mail clients, html editors, etc.

We really can't list out every feature and bundled app, because, after all, it's an entire operating system / Linux distro. However, we found that it's really easy to run on even older systems, as it's light on system resources, and it saves you tons of hard disk space, because you never *need* to install it. Of course, if you want to run the OS from your hard drive, just copy a single folder to a partition on your hard drive and you're all set. See <http://dynebolic.org/manual/x152.htm> for more information.

Video



Nothing consumes as much hard disk space as videos. While there are many free proprietary tools available for viewing videos, there are hardly any free proprietary video converters and editors. The most capable of these tools are from the Open source domain. Read on to find out why Open source video tools should find a place on your PC.

What follows is a review of the most popular of OSS video tools—viewers, editors, encoders etc. Before we begin, it is advisable to get all the codecs installed, either individually or by installing any of the all-in-one packs like the K-lite Mega codec pack. Get it from the essentials section in the *Digit* CD.

3.1 Players

Formats, Codecs And Other Undecipherable Stuff

FPS: for Frames per second. The number of movie frames displayed per second.

RESOLUTION: The number of horizontal and vertical dots that make up a display.

CODEC: Algorithm that is used to COmpress and DECompress a video/audio stream. Needless to say, a stream compressed using a codec needs the same codec to decompress it. Open source codec examples: Mpeg 1, Mpeg 2, Xvid, X264, etc. Other popular codecs include MOV, DivX, WMV, WMA, QT, RM

CONTAINER FORMAT: The file format used to pack data. Data (Audio, video, Text) can be compressed using any codec but should be packed in one of the many container formats. This would explain why it is possible to hear the audio even when the video codec is unavailable. Some containers are not compatible with certain codecs. Open Source container formats: Matroska, Ogg, etc.

ASPECT RATIO: The ratio of the width and height of a display. Most monitors use a 4:3 aspect ratio, whereas widescreen displays use the 16:9 aspect ratio.

AVI: Stands for Audio Video Interleave. So called because Audio and Video data are alternately arranged in the data stream. AVI is a container format.

DVD: Digital Versatile Disk. For the purposes of this article all DVD refers to Video DVD only. By default uses MPEG 2 for video compression and offers resolution of 720 X 576 (PAL) and 720 X 480 (NTSC). Audio can be compressed using other codecs.

3.1.1 Media Player Classic

Platforms: All Windows versions.

Home Page: <http://sourceforge.net/projects/guliverkli/>

Media Player Classic (MPC) is a no-nonsense media player that reminds us of the Media Player bundled with Windows 98. Albeit, this one is open source and loaded to the hilt.

MPEG: Motion Picture Expert Group. Default compression format for VCD.
Resolution : 352 X 288 (PAL), 352 X 240 (NTSC).

MPEG2: Motion Picture Expert Group 2. Default compression format for Video DVD. Allows significantly more features than MPEG1 in the form of menus, customisable angles, customisable audio output, customisable subtitles and languages.

PAL: Phase Alteration Line, a format of Video display used in India. This is made up of 600 lines refreshed at 25fps.

NTSC: National Television Standards Committee, a format of video display mostly used in US. This is made up of 525 lines refreshed at 29.97 fps. Since most DVD players available at present can play PAL and NTSC DVDs the distinction between these formats is not significant.

VOB: Files used to store data on DVD movies.VOB files use MPEG2 compression.

DAT: Video CDs use DAT files store data. These are normal MPEG 1 files with additional information.

INTERLACED VS PROGRESSIVE: These relate to how information is displayed on a screen. Progressive display shows the entire screen in one go. Interlaced display causes data to be divided into two fields—odd and even, each one consisting of the alternate lines on the display. So a PAL screen with 576 lines is made up of 288 lines of each field. Rather than display all 576 lines of a PAL display, Interlacing causes 288 lines to be shown in one go. Since these lines are closely packed and the display is refreshed at 25 fps, the difference is barely noticeable. But it usually shows up as jagged edges when fast movement is displayed.

Features

MPC comes as a simple stand alone executable—no installation files, no registry entries or other bloat. The interface is Spartan: unlike most other players that load up on the menus and decrease the viewing area, MPC's menus are modular, so unwanted components can be hidden. The full screen mode can be configured to include or exclude aids like the control bar and seek bar. One can change different properties of the video such as contrast, brightness, colour saturation, etc., provided the video codec allows it. The playback rate can be altered (fast forward or rewind) and audio is supported, up to 2X speed. MPC also allows capturing from Web cam or TV tuner. It also can encode files to DSM format. It has an inbuilt HTTP server which makes it easier to host your streaming, captured video, and the player can be remotely controlled through the Web interface.

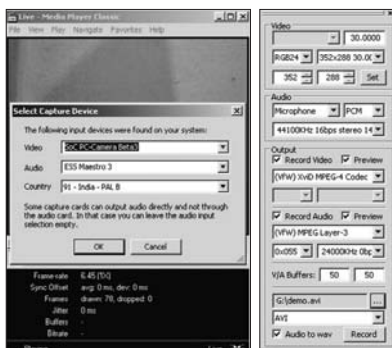
Playing a video source (file or disk) is easy. Just go to File > Quick Open and browse for the video file. If it is a DVD or VCD that you intend to play, choose **File > Open DVD/VCD**. The control bar allows you to increase or decrease the play rate. At 2X speed, the audio takes a comic, high pitch turn; while at 0.5x speeds you can get everyone to speak like Elvis. To capture images of the movie, use the **File > Save Image** option. Unfortunately, the image will be in the resolution of the movie and not the window. The File > Save thumbnail option will give you a single file containing many screen grabs the size and layout of which can be configured. To customise the interface, play around in the View menu. Enable or Disable toolbars according to your choice. Alternatively, you can also use the preset styles under View > Presets. If the video appears too dim, increase its brightness. To do this, use the Play > Filters > MPEG 1 (or corresponding Video Codec) Video Renderer option. You can also increase contrast, colour and hue similarly.

If the basic walkthroughs are boring, then you can try using the advanced features of MPC.

Capturing Video

Before you can use MPC to capture video, ensure that you have plugged in the capture device—webcam and TV tuner are popular capturers. First select the device, by the **File > Open Device** option.

Next use the **View > Capture** menu (it will remain greyed till the device is selected) to choose the location and name of the resulting video file. You can also set the compression options here. When all is set, click on “Record”. Once you have all you need, you can stop the recording. Watch out for the statistics spewing pop up that comes on when the capturing begins. This varies with the codec you are using to compress the video. If it is a bother it can be closed.



Selecting Webcam and Audio source

Capture options

Streaming Video

MPC allows you to create a streaming video site, since it bundles an HTTP server. First enable the Web interface under **View > Options > Web interface**. Here enable the “listen on port” option and add a port number. If you want to prevent others from seeing the results let the “Allow Access from Local host only” option remain enabled. This will only accept requests from the PC you are on. Once you are satisfied with the results you can disable this option, so that others from the network can also watch the stream.



Setting the web interface

Now, any time you play a video or view your webcam in MPC, any person can connect to <http://yourip:<port no>> to watch it.



The streamer and webview

Viewers can also control MPC through the interface by clicking on the relevant link.

Converting To DSM (Direct Show Media) Format

You can convert any file that MPC can play into DSM format. For this access the File > Utils menu. Right-click on the DSM converter window and add the file you want to convert. Then click on save as to provide a location and name to the converted file. To start encoding, click on start.

Concluding Remarks

For: An excellent video player which will play anything as long as the relevant codec is installed. Being able to hear audio when the movie rate is altered is also a nice touch. Add-ons like inbuilt capturing capability and HTTP server set it apart from other free media players.

Against: In the attempt to reduce bloat, MPC even did away with a help file, though for routine use the intuitive interface is child's play. The user manual, if needed, can be downloaded from the home page. Those interested in viewing their movies embossed or inverted, etc., will be disappointed, since MPC does not allow this easily. Encoding to DSM may not find many takers, so that feature is not of much practical use.

Overall, it is a must for all PCs, and it is automatically installed when you install the K-Lite Mega Codec Pack.

3.1.2 Video LAN Client (VLC) Media Player

Platforms: Linux, Windows, Mac OS X, BeOS, etc.

Home page: www.videolan.org

As the name implies, this started off as a project to create a video streaming server and playback client. Originally, there was a Video Lan Server and a Video Lan Client for each of the functions. But the crossplatform media player gained popularity and soon the server was reduced to a component of the Media player. This is a

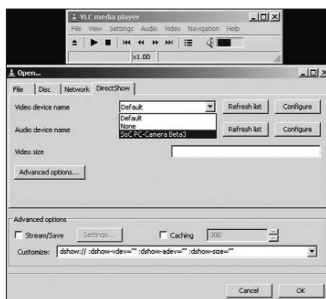
highly capable media player that comes with a lot of features, some of which most people don't know exist.

Features

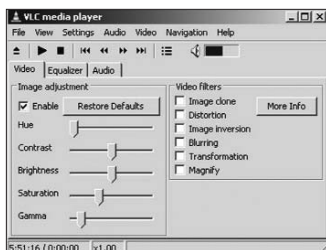
VLC's basic features are similar to those of its ilk. Playback rate can be increased or decreased, but, audio is disabled during altered rate of playback. Contrast, brightness, colour saturation, etc., of the video can be changed easily. Adding effects to the movie, like blurring, cloning, etc., is an easy task since the menu is easily accessible. VLC packs a streaming server which allows streaming any video from any source, like a tuner card or DVD, over the network. A wizard that makes setting this up easier is a life saver. A stream capture client allows you to save any video streamed over a network, including the Net. An inbuilt video editor and transcoder allows saving part of a file in a format of your choice. On the flip side, its menu system is bulkier than MPC, and the seek bar doesn't work as well. It has this annoying tendency to skip to predefined parts in a clip, and you have to carefully drag the slider to the desired position.

Playing a file or disk or viewing a webcam or TV-tuner output is fairly straight forward. Select the relevant entry under File Menu.

File > Open Directory will add every file in that directory to the Playlist, which can be accessed from **View > Playlist**. To alter display settings like contrast, brightness etc., go to **Settings > Extended GUI > Video**. Enable the settings for the changes to have an effect on the movie.



Open a webcam in VLC



Alter Video Settings in VLC

Under the Extended GUI window you can also find the Audio Equalizer. Here also the equalizer needs to be enabled for the alterations to have an effect. A slicker, but less functional, GUI can be used by switching interfaces from the Settings menu. For routine use, the skins2 GUI is recommended, but it doesn't remember the setting, so you'll need to apply it every time you start VLC.

VLC offers a lot more functionality than any other media player, that puts it in a class of its own. Its inbuilt video encoder lets you crop those parts of a movie that you like. To do this: while playing the file, go to Settings > Bookmarks option. Add bookmarks at the start and end points of the range you would like to save. You can create sets of start and end points that you want to extract. Once all ranges have been identified, select each start and end bookmark pair and click on Extract.

This will cause the transcoding wizard will pop up. You can choose to compress the audio and video or keep the original format. Depending on the audio video codecs chosen, the container format options change. Finally select a location and a filename (an extension is not automatically appended) and then click on save.

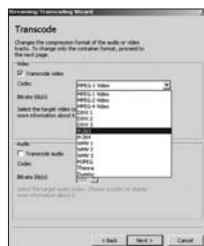
The only way to know the progress of the transcoding is to look at the movie progress bar. And there is no pop up informing you that the process has ended, so once the progress bar stops, wait a few seconds more and then assume that the process has completed.



Slicker skins



Bookmark to extract



Choosing codec in VLC

VLC includes a Wizard to ease the transcoding and streaming bother. Unleash the wizard from the File > Wizard menu. In the Streaming/Transcoding Wizard dialog box that opens, select “Stream to network”, after selecting the relevant option, click on Next and choose the relevant video file.

Next, select the protocol to be used for the stream. RTP (Real Time Transport Protocol) can utilize bandwidth better than HTTP. Select the IP address of the machine you want to stream to. If you want to stream to more than one PC, use RTP Multicast and set the IP range accordingly. If you would rather people connect to your IP and see the stream, you can do that by choosing the HTTP protocol. In this case, the stream is available at <http://your ip:8080> by default. The port number can be changed, if necessary, in the destination address box.

For streaming, you need not modify any other parameters, just click on “Next” till the Wizard finishes. You can monitor the streaming progress from the progress bar. Any person wanting to view the stream can use VLC for the purpose. Using the File > Open Network Stream option, the stream can be viewed.

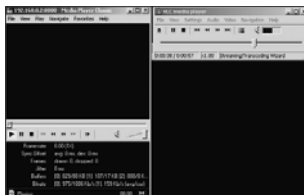
Much like streaming, the Wizard also helps you through the transcoding process. After selecting a file to transcode, most of the steps are similar to the ones described above while transcoding a part of a file.



Streaming in VLC



Streaming options in VLC



Viewing in MPC streaming in VLC

Concluding Remarks

For: VLC packs in more features than any other media player. By incorporating an editor and transcoder the need to have discrete applications for these jobs is minimised. Altering display properties is easy. The extensive audio settings and playlist functions also make it a formidable audio player.



Hot Key settings in VLC

Against: This true Open Source proponent shoots itself in the foot by insisting on using Open Source codecs only. VLC also does not use codecs installed in the system, rather uses those that it comes bundled with. So while it will play almost all video and audio files, out of the box, some files, such as Real Media audio and video cannot be played because their codecs are not Open Source. Also, the bundled encoding and cutting tool, though handy, is restricted. Glaringly, the full screen video mode does not have any controls (but the exhaustive hot key configuration helps)

VLC leaves out the all important Help file. But this would be needed only in case you wonder what the advanced settings were for. The manual can be downloaded from their site. Alternate skins need to be reapplied every session.

Overall, while it offers more than Media Player Classic, minor irritants mar the experience. It is definitely not the right solution for those who are looking for just a simple media player. However, people who are digitally adventurous will find that VLC hides a lot more than it reveals. Those who want to get their hands dirty will find that VLC Media Player is the Swiss army knife of their PCs.

3.2 Video Encoders

Encoding is the process of changing compression formats of the video stream. The most popular forms of video data available on the net are DivX, XviD, WMV, MOV. Unless you have a standalone player that supports these formats or intend to watch the movie on your PC, you need to encode these files into the VCD or DVD format.

The reverse process would be necessitated to save storage space. A DVD video would take upto 3.5 GB of space, while the same can be compressed to a 700 MB XviD/DivX file with minimal loss in quality.

If you are wondering, what are the minimum specs required to encode video; the best answer is, it depends on your patience. The faster the system, the less you have to wait for the process to complete. Also the more you intend to compress a video the longer the process will take.

3.2.1 Media Coder

Media Coder (MC) is a very capable but difficult to handle encoder. This is a front end that uses other Open Source video tools like FFmpeg and Mplayer in the background. Since it is in its infancy, the bugs have to be forgiven. The latest version (0.5) is buggier than older ones like 0.3.9 (at least in our case). This review refers to the latter.

Use: Convert MPEG2/MPEG1/AVI (DivX,Xvid)/3GP/MOV/Real Audio/etc., to MPEG2/MPEG/AVI (DivX)/etc.

Platforms: Windows

Home Page: mediacoder.sourceforge.net

Features

No other encoder boasts of such a range of encoding capabilities as MC. MC can convert into formats used in portable viewers like PSP, Mobile Phones, etc.

Simple encoding from one format to another is relatively easy. Use the Add file button to add the source file. Set the required encoding options in the boxes at the bottom. Compression can be set depending on the final file size or quality considerations. A three pass encoding process will give better results, but will take more time. Audio encoding options can be further tweaked in the window to the right.

Besides choosing the codec, the video can be further processed to remove noise (white dots that usually show up in amateur videos shot in poor light), or to crop the video or resize it. Keep in mind that additional options will increase the process time.

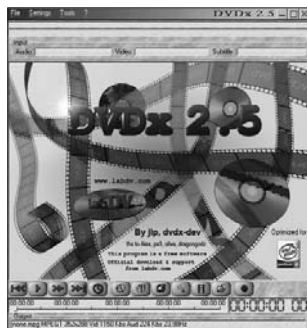
If you are interested in only a part of the movie, you can set the time range in milliseconds, here. Since MC does not have an easy way to mark out the ranges, you will need to view the file on another player to set the exact interval. Ensure you have done the math properly to avoid cutting out irrelevant parts. A millisecond is one thousandth of a second.

Once all settings are satisfactorily chosen, click on the start button on the top to let the encoding begin.

Concluding Remarks

For: Converts anything to anything, well almost. The project holds a lot of promise.

Against: MC doesn't come with a help file. A decent user manual is not available even on the site, you need to wade through the forum. Users should expect a few rough edges. Nevertheless, the full potential of the program could have been tapped if a meaningful help file were provided.



DVDx is a well-designed encoder

3.2.2 DVDx 2.5

Simple tool to encode DVDs.

Use: Convert DVD/VOB to AVI (DivX, XviD)/VCD/MPEG/WMV

Platforms : All windows

Home Page: www.labdv.com/dvdx/index.php

Features

DVDx is a nifty tool to encode DVD disks and VOB files copied to hard disk (without IFOs, it is more time consuming, so copy the entire Video_TS folder). You will find this handy if you want to save a DVD movie without having to spare the 4 to 9 GB that it will consume. Thankfully, DVDx comes with an extensive help file



The input bar in DVDx

offering step by step instructions for getting the job done perfectly. (So we need not replicate their hard work). This single objective tool has an intuitive and user friendly interface (there isn't much to do anyway). Novices can use the encoding option of specifying final file size, while experts can individually tweak quality options. And to help you decide what to do while the encoding occurs, it informs the expected time for the total job. One major drawback is the inability to save a part of the movie.

Encoding a movie is fairly straight forward, and the included help file offers step by step instructions. One probable area where questions could arise is the resolution and fps to be given when encoding to Xvid or DivX. If the original video's resolution and fps are needed, check the input bar when the file is loaded. Altering these parameters will increase encoding time.



Output settings in dvdX

To encode, first Open the file or DVD from the File menu. Then set the encoding options in the **Settings > Output Settings** menu.

Here you can specify the output file format and resolution. The final file size can be set under “Volume don’t exceed” option, this will influence the quality of the output and the time of processing. Since compression usually involves some loss in quality, compressing excessively will degrade quality conspicuously. The “Check Standard” button will inform you whether the resulting file will comply with VCD or SVCD standards, and hence be playable on a stand alone player.

Conclusion

For: Simple tool that fulfills its promises.

Against: Cannot extract parts of a movie.

3.2.3 Dr DivX

This Doctor makes it easy to create DivX (AVI) movies. With standalone DivX players becoming common, Dr. DivX is an excellent tool to have.

Use : AVI (DivX, XviD)/VCD/MPEG/WMV/VOB/FLV/MOV to AVI (DivX)
Platforms: Windows XP

Home page: <https://sourceforge.net/projects/drdivx/>

Features

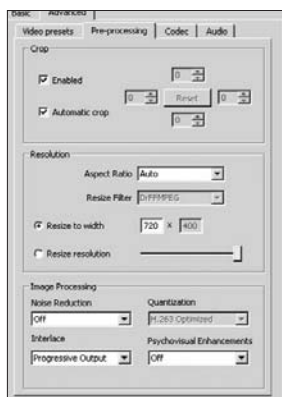
The interface is quite Intuitive and user friendly, with extreme dearth of menus and buttons you just can’t do anything wrong! The Doctor supports encoding options like ability to specify final file size, cropping video, de-interlacing, etc. You can also prepare multiple files for batch processing. During installation, the software also copies a help file, though finding it was a wild goose chase. Alas, Dr DivX doesn’t allow encoding part of a movie.



Dr DivX Main windows

With very few buttons to play with, finding the right one is really easy. Open the file you intend to encode by using the Open button in the Input File field.

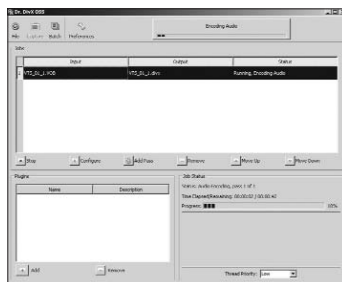
Next you can set the quality/file size options. The DivX certified settings correspond to the following resolutions: High Definition—1280 x 720 at 30 fps, Home Theater—720 x 480 at 30 fps, Portable—352 x 240 at 30 fps or 352 x 288 at 25 fps, Handheld: 176 x 144 at 15 fps. Quality settings impact on the method of compression and the algorithms used to achieve this. Constraining the output file to a fixed size frees you from further tweaks. You can save the settings you have made under a profile with the Save Settings button, and recall these to be used for the next job by using the Custom Profile option. If you are not interested in tweaking individual settings, you can click on the Encode button and be on your way.



Advanced settings in Dr DivX

The Advanced tab allows further refinement of the encoding output. Under the Preprocessing Tab, you can specify additional options like the cropping range, or choose automatic crop in which case the program will cut black borders (noticed on wide screen movies when seen in normal displays) automatically. Doing this decreases file size without losing quality. You can also change resolution and aspect ratio here.

Noise Reduction is useful in cases where there are too many “grains” in the movie, especially in Home videos. Choose settings accordingly. Progressive output



Wait while the doctor operates

will ensure better results. If “Psychovisual Enhancements” are applied, the Doctor promises to increase the quality of the output by using advanced techniques to detect and improve those areas of the film which will be most noticed by the human eye. Better quality equals more encoding time. Once all settings are made, click on the encode button. This sends the job to the job queue, but the process doesn’t start immediately. You need to click on the start button to let the Doctor operate.

Concluding Remarks

For: Simplicity

Against: No help file, but it isn’t needed.

A recommended program for those who seek simplicity and effectiveness foremost.

3.2.4 DVD Flick

A Simple tool to author/create DVDs

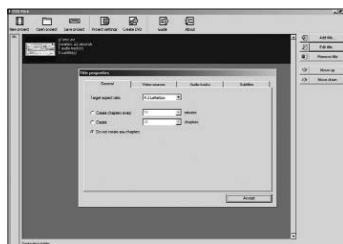
Use : MPEG1, AVI, OGM, MKV > DVD

Platform : All Windows

Home Page: sourceforge.net/projects/dvdflick

Features

Like Dr. DivX and DVDx, DVD Flick is a single track application. The well organised interface and lack of menus means users will not waste time navigating. DVD Flick is simple to use and can create DVD5 (3.5 GB) and DVD 9 (8 GB) DVDs with all the bells and whistles—like subtitles, multiple audio tracks, etc. The included user guide offers all the instruction needed create a perfect DVD.



Add a title to your DVD Flick

You start off by adding an input file by using the Add Title button on the right hand column. Right-clicking on the title will offer

options about chapters, subtitles etc. Once all titles have been added, click on Project Settings to set the output file parameters like size, format and Audio settings. If all settings are to your satisfaction, click on Create DVD button to start.

Concluding Remarks

For: Simple to use

Against : None.

3.3 Video Editors

3.3.1 VirtualDub

VirtualDub (VD) is an advanced video editor (only for AVI files) and packs in a lot of tweaks to satisfy the needs of users of all skill levels.

Use: AVI editing. Convert AVI/MPEG to AVI

Platform: All Windows

Home Page: www.virtualdub.org

Features

VD excels in handling AVI files. Cut, join, filter, encode, capture, etc., are some of the processes it can put an AVI file through. It bundles along a host of features and add-ons to customise every aspect of processing AVIs. Various monitoring tools are also available which can make VD an AVI connoisseurs pet. VD doesn't pack an installer, just unzip and it is ready to go. The extensive help file which describes all the options of VD is quite useful. One drawback of VD is its intolerance of VBR (Variable Bit Rate) encoded Audio streams. When presented with such video files, VD will personally re-encode the entire audio to CBR before moving ahead.

Edit

Editing an AVI file is child's play. Open the relevant file in Virtual Dub by using the **File > Open Video** menu. Select the start and end of the clip you want to edit. It is highly recommended to use the

Key frame button to mark these points. Since an AVI file has audio and video data interleaved, random cutting could lead to orphan audio or video data chunks causing the resulting file to be out of sync or difficult to seek. Cutting at a key frame precludes these problems.



Use keyframe selector for fast results

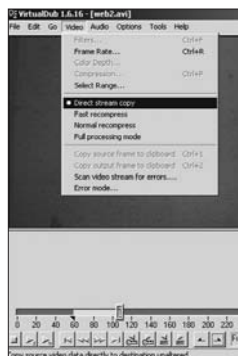
If this clip is to be removed from the rest of the movie, Choose Delete from the Edit Menu. If this clip needs to be placed elsewhere, do a cut and paste after positioning the marker at the place where the clip needs to be inserted (again position marker at Key frame). After all necessary manipulations are over, set “direct stream copy” in the Audio and Video Menu. Then choose Save As AVI in the file menu and select a destination.

Join

If you would like to join two AVIs, VD will play ball on one condition: the two AVI files must have the same resolution and frame rate and have been encoded with the same codec. OK, three conditions. First open the first file, then select the File > Append file segment option and add all segments you want to merge. Then Select File > Save as AVI and choose a destination file.

Synchronise Audio and Video

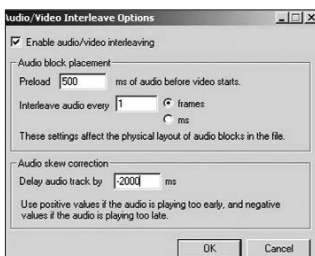
Sometimes encoded audio and video are not in sync. VD offers a painless way to correct this. Load the video file. Set “direct stream copy” in the Audio and Video Menu. In the Audio menu, under Interleaving, set the required audio delay—positive if the audio precedes the video and negative if the audio follows. Since the figure is in milliseconds, you need to multiply the seconds with 1000 to



Direct Stream

get the relevant value. After entering the required figure, save the AVI from the File menu.

Direct Stream Copy Mode is the fastest working mode since the data is not passed through the codec. Most functions of VirtualDub require the use of other Processing Modes (especially when dealing with non-AVIs since VD will not output in any other format). This means that the source file is decompressed, and the processing is done to the uncompressed audio/video and then the audio/video is recompressed. Undoubtedly, this takes more time.



Sync audio and video in VirtualDub

Create a Compressed AVI

Uncompressed AVIs take up a lot of space. If, while trying any of the procedures mentioned here, you see that the final file size is too large, you can assume that you have not applied any compression. To apply compression, select the Video > Compression option (will remain grayed-out if Direct Stream Copy mode is selected).



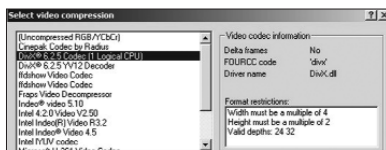
Here you can see all the codecs installed in your system and can choose which codec to use. The selected codec can be configured to suit your needs. The requirements of each codec are also specified. Unless the movie meets these specifications, the encoding will not take place. The Audio stream also can be compressed by using similar options under the Audio menu. If you would like to compress an MPEG file, open the file then apply the relevant codec from Video > Compression and select File > Save as AVI.

Choose a compression mode

Capture Video

To begin a capture select **File > Capture AVI**. In the capture window, select a device to capture from, this can be a webcam or TV tuner.

Assign a file name for the captured file under **File > Set Capture File**. Under **Video > Capture Filter**, you can further tweak the settings for the device output like brightness, contrast, etc.



Get your codec specs right

If the video has a lot of noise, use the **Video > Noise Reduction** menu to improve the image. You can also crop the video from the **Video > Cropping** menu. You can choose to compress the file by

using the **Video > Compression** menu. Compression on the fly may cause some frames to be dropped, unless your PC is fast. Under Capture menu you can set the capture frame rate (**Capture > Settings**) and the conditions under which you want to stop capturing (**Capture > Stop conditions**) like time or file size.



How not to do it

If the settings are satisfactory, use the **Capture > Capture Video** menu to start, and the **Capture > Stop Capture** option to manually stop capturing.

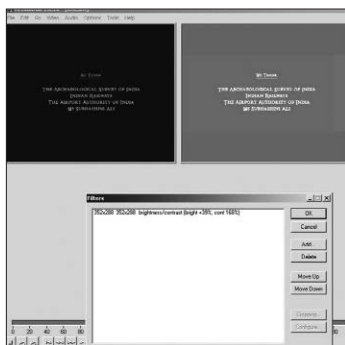
Adding filters

VD offers advanced tools to manipulate the video screen in the form of Filters. This is another name for special effects like blurring, embossing etc. You need to be in Full processing mode to manipulate the movie.

To add a filter, first load a movie, then select **Video > Filter**. Here you can see the various effects at your disposal and a preview of the effect of each filter can be seen. One point to bear in mind is that you can apply more than one filter at one go, but the order of appli-

cation of filter will influence the final results. So if you have a logo filter first (adds a logo to the movie) and a blur filter next (blurs the movie), if carelessly done, you would end up blurring the logo you just applied. So, in this instance, the logo would be the last filter to add.

After all filters have been added, choose **File > Save As AVI** for the job to begin.



Input and Output with filter applied

Audio Filters can also be applied similarly. They can be accessed under **Audio > Filters** when in full processing mode.

Virtual Dub offers a lot more advanced features than just application of filters. The included help file is extensive in describing how to exploit these.

Concluding Remarks

For: Advanced editor catering to novice as well as experts. Formidable array of features which are well documented making it easier to use advanced features.

Against: None.

3.4 Miscellaneous Utilities

3.3.1 Movecapture

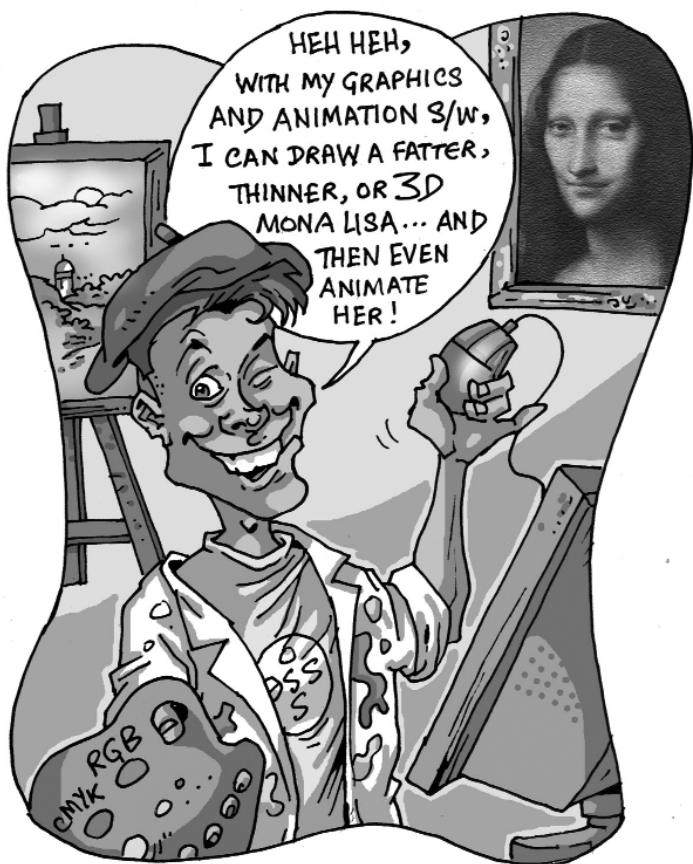
Movecapture is a movement detection and recording system. You need a webcam to use Movecapture, since it is basically a video capture application with a twist.

Features

Movecapture is built for one job, and does it well. With the Webcam plugged in, Movecapture first captures a base image and then continuously compares present image with the base image—at the rate of once per second. If any changes are detected then the images are saved at the rate of 10 per second. The threshold of what is to be considered a change can be altered. By using this simple logic Movecapture poses as an effective movement capture application. Of course, it may not be suitable for professional uses, but it's effective.

To use it, just plug in webcam and run the program.

2D and 3D Graphics



If you're doing the "struggling digital artist" bit right, you need to go get yourself the cream of the open source brigade for your 2D and 3D graphic needs—whether it's vector illustrators *a la* CorelDraw, Flash animation or even powerful 3D tools. Keep in mind though, that a tool is only as good as the person using it.

4.1 2D Graphics

4.1.1 Inkscape

If you're looking for an alternative to Adobe Illustrator or CorelDraw, chances are you'll find it in Inkscape. It comes for Windows, Linux and Mac OS X, and setting it up on any of them is a no-brainer.

Inkscape's primary function is as an editor for the SVG (Scalable Vector Graphics) format—the W3C's standard XML format for vector graphics on the Web. Because SVG is nothing but plain text that is rendered to an image by the browser, it is very bandwidth-friendly, and when used right can create some very impressive graphics. Writing XML code to create graphics is something that only the gifted can do without assistance, however, so such graphical editors are much appreciated by the community at large.



An example of Inkscape's abilities

Inkscape's features will always be restricted to the offerings of the SVG standard, so they're bound to hit a ceiling sometime. In the meanwhile, you can create graphics with complex shapes and paths, transparency effects, gradients and patterns. You can also import and export files in the Adobe Illustrator (.ai) format.

You can also trace simple raster graphics (JPEG, PNG and the like) to convert them to the vector format, though this feature isn't as evolved as Corel's or Illustrator's bitmap-tracing capabilities. Another shortcoming is the limited freedom that one has in terms of brushes—you can't set your drawings to look like they were scratched out with a piece of charcoal (not without some difficulty, at least).

Overall, Inkscape is light, easy to learn, and an undoubted essential if you want to create SVG images for your Web site. And with the three major browsers supporting SVG, it might just be time to consider that.

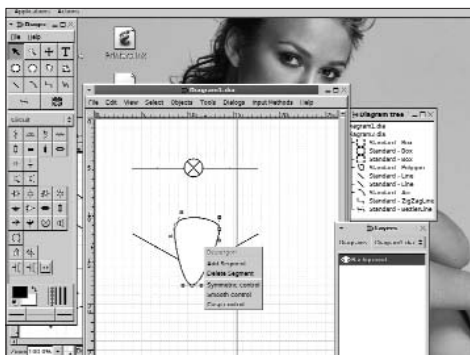


The Inkscape interface

Site: www.inkscape.org

4.1.2 Dia

The open source alternative to the popular flowcharting tool Visio, Dia is a simple tool to create flowcharts in a quick and painless manner. It lets you create various shapes, connect them in the flowchart, and even create custom shapes.



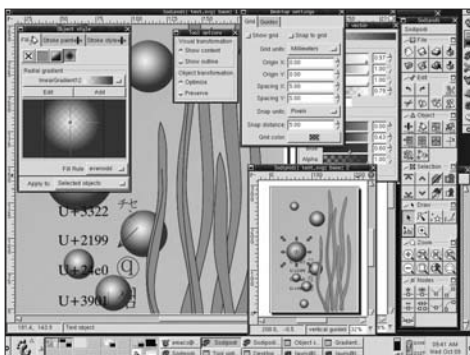
Dia is excellent for flowcharts and diagrams

Dia can be your tool of choice no matter who you are—it comes with a ton of preset shapes, ranging from simple polygons to electrical and electronic components to network elements for the meticulous sysadmin. There is even a set for making UML (Unified Modelling Language) diagrams for software developers. To expand Dia's capabilities, you will need to use one of the many programs available—Dia2SQL, for example, turns your Dia diagrams into SQL databases—very handy if you're structuring your Web site.

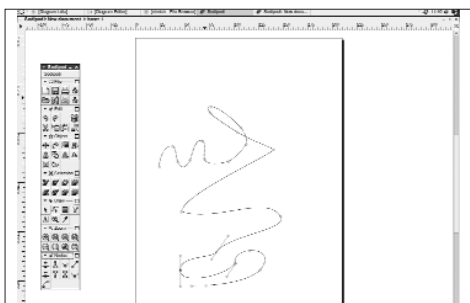
Site: www.gnome.org/projects/dia

4.1.3 Sodipodi

The inexplicably-named Sodipodi is another alternative for vector illustration, and apart from the way it looks, is much like Inkscape itself—Inkscape, in fact, is a spin-off of the Sodipodi project. Its primary graphics format is also SVG, making it another must-have for web designers.



Don't let the silly name fool you, Sodipodi is quite capable



It runs a bit slower than Inkscape, but its output looks excellent, justifying that extra overhead to some extent. Its one-stop toolbox makes it easy to use, though Inkscape ultimately has better SVG support.

Sodipodi's interface starts out quite basic

Site: www.sodipodi.com

4.1.4 The GIMP

(<http://gimp-win.sourceforge.net/stable.html>)

The GIMP, or GNU Image Manipulation Program, was first released by two Berkeley students in 1996. It has since evolved into a powerful little program; the latest build, GIMP 2.0, has completely revamped its look, and this makes it a legitimate player amongst the mainstream image editors. Installation in Windows is a breeze. The GIMP opens in a smattering of windows littered all

over the screen. One box contains all the usual tools—crop, zoom, filter, resize, perspectives, fill, draw, paintbrushes, etc.; another has a list of layers, paths, and colour channels. An image opens in a new window, so with the potential of having dozens of open windows and boxes, the higher the resolution the better. The GIMP is not only an image editor, but also a full-fledged drawing and painting program. It offers a wide spectrum of features like a full set of painting tools, anti-aliasing (the technique of minimising jagged or blocky patterns), full alpha channel support, and transparencies and layering. A cool transformation tool is rotation, which allows you to rotate an image to any scale or angle. The usual image formats are supported.

Once an image is loaded, right-clicking on it brings up a menu offering many tools and special effects. There's layer control and a full spectrum of filters for adding distortions such as engrave, emboss, scratches, etc., artistic tools such as canvases, oil painting, and many more. Bump mapping is supported. (This is a computer graphics technique where at each pixel, a perturbation to the surface normal of the object being rendered is looked at in a height map and applied before the illumination calculation is done; the result is a richer, more detailed surface representation that more closely resembles the details inherent in the natural world. Also supported is control of lighting effects. You basically have full control over all effects. Animation and video editing tools are also included.

The GIMP is definitely not aimed at beginners, and one is advised to read the help files (which are not very detailed) and the user manuals before jumping right in, so as to avoid being overwhelmed by the sheer power of this software.

Note: The GIMP requires the GTK 2 (GIMP Toolkit) and above runtime environment to run. Also, when uninstalling The GIMP, remove The GIMP before the runtime environment, otherwise your system will always assume that The GIMP is the default program for all images.

4.2 2D Animation Tools

4.2.1 UIRA

Increasing frustration over the lack of a Flash authoring tool for Linux eventually led to the starting of the Flash4Linux (F4L) project, which (predictably) got itself embroiled in legal issues regarding the name. The project shut down, and in its place rose UIRA (UIRA Isn't a Recursive Acronym), which also took some cues from the another project called QFlash. The project is still in beta, and ActionScript (Flash's native programming language) support is a little shaky, so as long as you stick to making basic SWF animations without programming, you shouldn't run into much unpleasantness. The interface is built to be similar to Flash to make the transition easy, and it lets you import SVG files (the ones you create in Inkscape, perhaps?) for your animations.

Site: www.uira.org

4.2.2 Synfig

Once an in-house solution for professional 2D animators, Synfig went open source when Voria Studios, its parent company, went bankrupt. While they were in business, however, they did manage to churn out some compelling-looking work, so the release of their tool to the general public was a considerably well-received idea.

Using Synfig is quite like using any vector drawing tool, only you can animate your drawings once you're done with them. All you need to do, really, is define a



Synfig's "professional" intentions seem quite clear

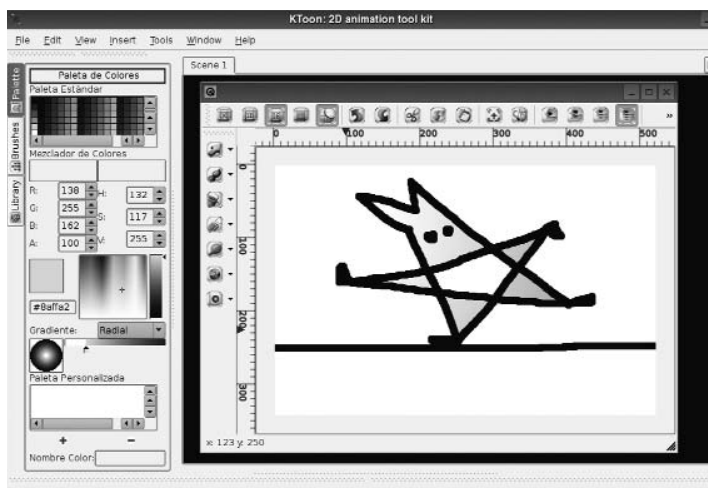
starting and ending position for your drawing, and the program calculates the intermediate frames for you. You will, naturally, be able to customise these intermediate frames as you please. Oddly enough (or is it?), the Windows version of Synfig was a snap to set up, as opposed to the twenty-odd minutes it took us to get it started on Ubuntu 6.06 (Dapper Drake)—they only have unstable releases for the still-in-development Edgy release and not the current Dapper.

Site: www.synfig.com

4.2.3 KToon

KToon was created by Colombian animators Toonka Productions to spark off an interest in animation in the youth of Latin America. The product is still in beta, but it's already received more than a few appreciative nods. As of right now, it's only available for Linux, but a Windows version is expected soon. You can even download a KToon Live CD if you don't want to install it right away.

KToon can create vector drawings and animations, and export them to both the SVG and SWF formats, making it a somewhat acceptable solution for basic Flash animations. It lacks



KToon: By animators, for animators

ActionScript support, though, so it's still not a complete replacement for Flash.

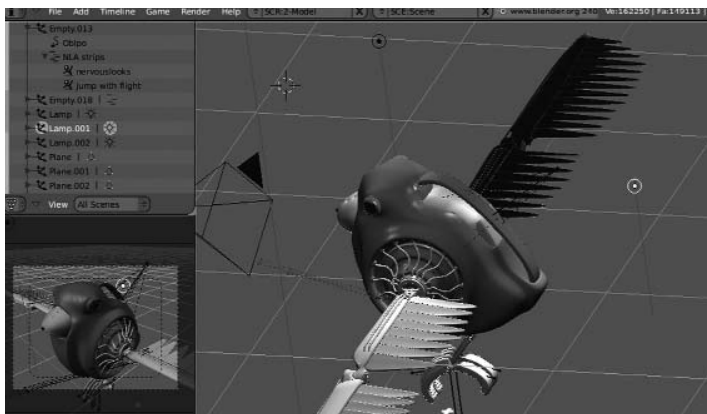
The program is composed of two major modules right now—Illustration and Animation. No points for guessing what each does. We'll be seeing more modules in future releases.

4.3 3D Graphics

4.3.1 Blender

Few open source tools have ever made such a mark as Blender—and for good reason. Blender is an excellent 3D modelling and editing program, and in our experience one of the best open source tools ever. One thing that has always been considered Blender's shortcoming is its unconventional interface—anyone used to any other 3D graphics tool invariably ends up feeling like a fish out of water. As it turns out, with a little patience, the interface is a very easy one to master—read more about that in this month's magazine.

You can get Blender for both Windows and Linux, and both versions are quite stable and relatively bug-free. To effectively use it,



Blender is often unfairly accused of having a difficult interface

you'll need to change the way you use the keyboard and mouse—working with Blender is a dream when you use both together. You don't even need an exceptional machine to run it—it works smoothly even on mid-range PCs, stuttering a bit only when you load too many objects into your scene (as expected, of course).

Apart from letting budding 3D artists explore their skills, Blender comes well-loaded for professionals as well. It has a competent database system built into it, which lets you share objects across different projects, skeletal animation for creating realistic characters, and Python scripting to create your own custom effects and animations.

Finally, you can even create your own games in Blender, though not without some programming knowledge.

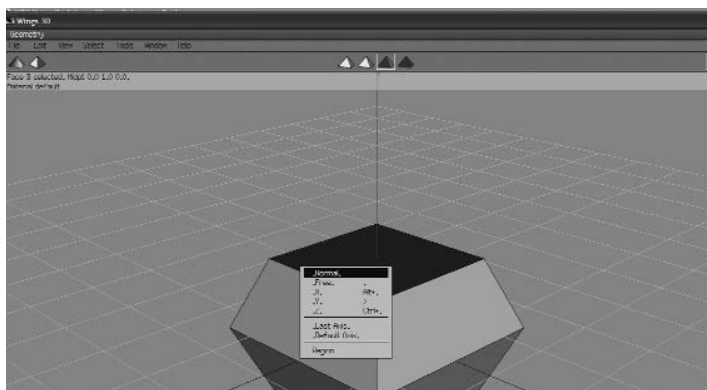
Site: www.blender.org

4.3.2 Wings 3D

Wings 3D is a tool for creating 3D models, and doesn't pretend to be anything else. The very simple interface lets you get straight down to your box-modelling business without any real learning curve. All you need to know is that the mouse's middle-click puts you in the "orbit" mode, left-clicking selects objects or their elements and the right-click brings up the context-sensitive menu, and you're set. Wings is built on the Erlang programming language, and lets you key in Erlang code while the program is running.

If you're looking to build models with high levels of detail and tremendous complexity, though, Wings shouldn't be your first choice. While it excels with low-polygon models (best used if you're making or modding a game), Wings does tend to get sluggish with more intricate models.

Wings has only a basic renderer, so you'll need to pair it with something more powerful like POV-Ray (read about it later in this chapter). It also has no support for animation, so once you've built



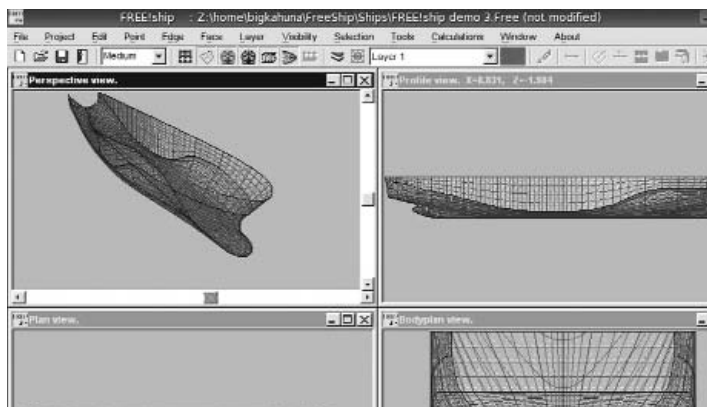
Wings 3D is deceptively plain

a model in Wings, make sure you have a good 3D animation tool waiting in line to animate it.

Site: www.wings3d.com

4.3.3 FREE!Ship

Ever wanted to build your own pirate ship but were too lazy to get started? Or was it that you weren't yet skilled enough in the ways of 3D graphics programs? FREE!ship comes to the rescue, built specifically to let you design and modify ship hulls. It uses subdivision sur-



The FREE! that launched a thousand ships

faces rather than the more popular NURBS modelling technique, which lets you make very nuanced changes to your hull easily.

It offers you the features you'll need to work with hulls in other 3D programs—you import and export parts of or complete models in popular formats like .3ds. It also comes bundled with Wizards to construct the rest of your ship—keels and rudders, for example. It isn't all about silly boats though—FREE!ship also comes with features that calculate the performance of the hulls if actually submerged in water, so if daddy gives you enough money to build a *real* boat someday, and if you have the skill, you'll know the best hull design well in advance.

FREE!ship comes as an executable for the Windows platform, but works just as well with Wine in Linux.

Site: www.freeship.org

4.3.4 POV-Ray

POV-Ray (the Persistence of Vision Raytracer) is essentially a program for raytracing 3D scenes rather than modelling them. While it is open source in that you're free to download and modify the source code, it isn't licensed under the GNU-GPL. The gist of the matter is that you can modify it all you want, as long as you're doing it for yourself—the restrictions come in when distributing this modified code.

To create scenes in POV-Ray, you need to use its Scene Description Language (SDL). The language is then translated into your 3D scene. It's hardly the most convenient way of going about things, but once you get the hang of it, it works brilliantly. Professional graphics artists swear by POV-Ray, and as you see here, they know what they're talking about.

If you're interested in using POV-Ray, you should definitely learn the SDL. However, there are a lot of front-ends for it, which can export your 3D scene to SDL. Good examples are PoseRay



An excellent example of POV-Ray's raytracing abilities

(<http://mysite.verizon.net/sfg0000/>) and Yet Another POV-Ray Modeller (<http://sourceforge.net/projects/yaprm>).

Inconsequential Trivia: POV-Ray was the first raytracer in space—billionaire Mark Shuttleworth used it to render an image during his trip to the International Space Station.

Site: www.povray.org

System Tools



There are a host of open source tools that cater to almost all aspects of the system. Many among them are even better than their commercially-available counterparts. We will look at some of the most innovative and effective tools in this sphere.

5.1 Disk/Partition Management

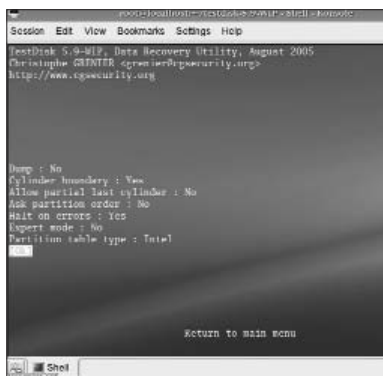
The Internet plays host to many tools that cater to almost all conceivable disk-related issues. Let's take a look at how to manage hard disks and create partitions.

5.1.1 TestDisk (www.cgsecurity.org/testdisk.html)

TestDisk is a powerful data recovery software, and was primarily designed to help recover lost partitions and/or make non-booting disks bootable. These may be caused by faulty software, viruses, or human error. With TestDisk, even partition table (a filesystem table that contains information about how many and which types of partitions are on the disk) recovery becomes really easy.

When a hard disk drive crashes, the first thing to do is to make sure no more data is written to the drive. If we have a situation where the partition table is all right, but critical operating system files have been damaged, Windows will not boot. In such a case, if there is another OS installed on the system under consideration, the HDD may still be read. So, you can gain access to the files on your hard drive with a crashed OS by booting the computer with a DOS boot disk and then use a DOS-compatible file recovery program such as TestDisk.

In addition, we should mention that transferring the HDD to another computer prevents the drive from being written to accidentally, and could allow you to retrieve information from the disk. At times, all that is required is to use Windows Explorer (on the system to which the drive has been transferred) to look through the file structures.



Quick crash recovery with TestDisk

TestDisk is capable of restoring lost information in a matter of minutes. It supports all major operating systems, and also RAID-configured drives. It has Linux versions as well.

TestDisk queries the BIOS or the OS in order to find the hard disks and their characteristics. It does a quick check of the disk's structure and compares it with the Partition Table for entry errors.

If the Partition Table does have entry errors, TestDisk can repair them. If there are missing partitions or a completely empty Partition Table, TestDisk can search for partitions and create a new table or even a new Master Boot Record (MBR) if necessary. Now, a master boot record (MBR) is the first sector ("sector zero") of a partitioned hard disk, and is responsible for retaining vital system information such as the partition table, and the Bootstrap loader.

TestDisk has features for both novices and experts. For amateurs, TestDisk can be used to collect detailed information about a non-booting drive, which can then be sent to data recovery professionals for analysis. Those more familiar with such procedures should find TestDisk a handy tool in performing on-site recovery.

1. Upon starting TestDisk, you get a screen at the top that lists your available physical drives.

2. Highlight the drive you wish to recover and select the Analyze option.

```
TestDisk 4.4, Data Recovery Utility, March 26 2003
Christophe GRENIER <grenier@cgsecurity.org>
http://www.cgsecurity.org

* FAT32      0  1  1  811  31 63  1636929 [WIN98]
Use arrow keys to change directory, enter to quit

<DIR> 28-Oct-2002 18:13 .
<DIR> 28-Oct-2002 18:13 ..
1063 23-Apr-1999 22:22 AUTOEXEC.BAT
1005 23-Apr-1999 22:22 CONFIG.SYS
1416 23-Apr-1999 22:22 SETRAMD.BAT
14764 23-Apr-1999 22:22 README.TXT
6855 23-Apr-1999 22:22 FINDRAMD.EXE
12663 23-Apr-1999 22:22 RAMDRIVE.SYS
14386 23-Apr-1999 22:22 ASP14DOS.SYS
21971 23-Apr-1999 22:22 BTCDROM.SYS
```

TestDisk's recovery console

3. This will show the current partition structure, and upon hitting [Enter], will start searching the drive to see whether the actual partitions match. Make a point to take this information down.

4. Once this search is complete, hit [Enter] again. It's a good idea to run the "Search!" option to do a more comprehensive search of the drives.

5. If you initially had no partitions shown because of a damaged or wiped partition table, TestDisk will now hopefully have rediscovered the partitions.

5. Verify the information and select Write to save the new information onto the disk. If removing your partitions was the only damage you did, you should now be up and running again.

7. If you have erased or damaged your Partition Table, nothing will be displayed under the listings, as above. In this case, you should select the "Advanced" option. The tool will assist you in revamping your HDD in the same manner, as above.

TestDisk will compare the boot sector to the backup boot sector. If they are identical, it can do nothing more, but if they are different, it will ask you if you wish to overwrite the boot sector with the information from the backup.

5.1.2 Partition Logic (<http://partitionlogic.org.uk>)

Partition Logic is a free hard disk partitioning and data management tool. It can mirror entire hard disks to another as in Norton Ghost, and it can manipulate partitions—create, delete, format, etc.

Partition Logic boots from a CD or floppy and runs as a stand-alone system, independent of the regular operating system. Therefore, it is very light (in terms of size) and supports most basic PC hardware without the need for any additional work or configuration. It has certain hardware limitations (like no support for SATA hard disks), which are promised to be rectified in future updates.

Installation

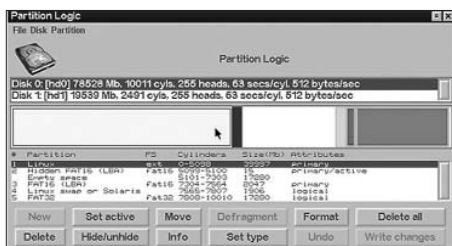
Partition Logic comes as a self-contained CD image with its own operating system (Visopsys) included on the disc. It is not installed as a

Windows/Mac/Linux program. It is written to a blank CD from which your computer can be booted to perform the desired operation.

Partition Logic is distributed as a compressed Zip file. The Zip file contains just the CD image, with the .iso file extension. The installation process consists of unzipping the ISO file and burning it to a CD. However, the burning application must typically be instructed to burn from a disc image. It does not burn like a regular data disc.

How to Use It

The menu bar contains three menus: File, Disk, and Partition. Operating around is fairly simple, since the most-used commands are in the form of action buttons. The commands under the Disk menu are not found as action buttons.



Manage partitions with Partition Logic

The disk list shows the physical hard disks detected on the system, and displays the size and other details of each. Clicking on a disk selects it, and it will subsequently change to show the partitions on the new disk. The partition list is a clickable list of partitions on the current disk. In order to do an operation on a partition or empty space, it must first be selected.

Among the action buttons (that is, the commands), there are two that are very interesting:

1. **Undo**—This is used to discard any pending changes that have not been committed to disk using the write changes function. Examples of the various operations that can be undone are partition creation and deletion, setting or un-setting the active partition, and hiding or un-hiding a partition.

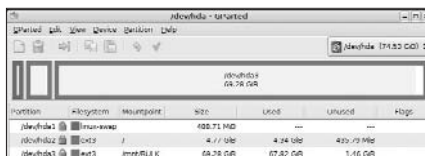
2. **Write Changes**—The write changes function is used to commit any pending changes to the disk.

Carrying out operations in Partition Logic is fairly simple. For example, to make a new partition, you use the Create function. The user must first select some empty space in either the partition diagram or the partition list. Clicking this button or menu item raises a dialog window to prompt the user for information (location, size, etc.) about the partition to be created. No changes are made on disk until the user commits them using the Write Changes button.

5.1.3 GParted (<http://gparted.sourceforge.net>)

GParted translates to Gnome Partition Editor. It is used for manipulating filesystems, that is, create, resize, etc. The stand-out feature is that it is used for creating space for new operating systems, and for disk imaging.

The purpose of GParted is to allow the individual to take a hard disk and change the partition organisation therein, while preserving the partition contents.



The GParted Live CD is light and simple

GParted maintains a very simple GUI. It is downloaded as a “live CD” .iso image, from which a bootable CD can be created for the system.

There are some Linux distributions that are Debian-based, and use a software called apt. Certain others are Red Hat based, and use a software called yum (yumex, kyum). To download and install GParted, use:

```
# yum install gparted
or
# apt-get install gparted
```

The Interface

The first window that opens when GParted is started is as shown.

Upon clicking the GParted menu, a pop-down menu is presented. The user can select to refresh the display of the drives on the system. The second choice, Devices, allows to choose the hard drive whose partitions are to be modified. This is useful if there is more than one hard drive. The third option under the Gparted menu is used to obtain more information.

The Edit menu shows two greyed-out functions that are quite useful: Undo and Apply. These options may also be seen in the toolbar. To activate them, you have to choose the partition to be modified.

Then, under the View menu, the Hard Disk Information Panel displays details about the hard disk, such as model, size, etc. This panel is most useful in a multi-hard-disk system, where the information is used to confirm that the hard disk being examined is the one that is wanted. The most important menu is the Partition menu. It allows you to do many operations.

How to use it

Delete is selected if you want to delete a partition. To perform the delete, you must first select the partition. You may also format any partition to a filesystem that is supported in the menu under “Format To”.

The user may also format any partition to a filesystem that is supported in the menu.

Creating a new partition

The New button on the toolbar allows you to create a new partition, if you have already selected an unallocated area. A new window appears and lets you choose the size you want, and also specify the kind of partition: Primary, Extended, or Logical. It also allows you to specify the filesystem.

5.2 Benchmarking Tools

Benchmarking is the process of determining who or what is the best, who sets the standard, and what that standard is. Once we decide what to benchmark, and how to measure it, the object is to figure out how the winner got to be the best, and determine what we have to do to get there. For example, the Australian cricket team, for most fans, sets the benchmark. In the same manner, we pitch one computer system against set standards to assess performance.

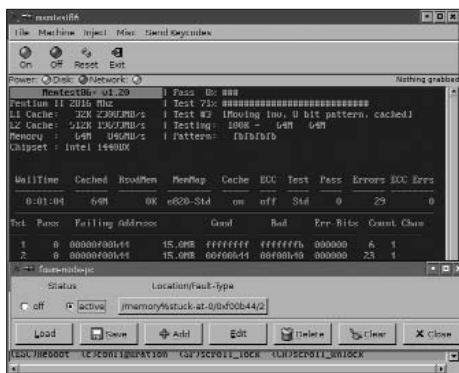
5.2.1 Memtest86 (www.memtest85.com)

Memtest86 is a RAM reliability tester. The underlying thesis is that a correctly-functioning computer should be able to store data in the RAM with 100 per cent accuracy. If it does not, then it will be unstable and prone to crashes.

Memtest86 is designed to stress-test the computer's RAM for errors. It is designed to run from a bootable floppy disk or CD-ROM, or from a suitable bootstrap loader, without an operating system being present. The tests are sufficiently harsh for it to find otherwise unrecognised problems on machines that appear to work normally.

Installation

For a Windows installation, you need to download either the Pre-Compiled Windows package, for building a bootable floppy disk, or an ISO (Zip version) to create a bootable CD. After the file download is complete, you decompress the file(s). To



Is your RAM all right? Memtest tells you All

extract, right-click on the downloaded file and select the “Extract All” option. The extract option will let you choose where the files will be extracted to.

To build a bootable floppy, insert a floppy in the drive, then go to the folder where the files were extracted and click on the Install icon. Once the install is complete, the floppy disk will appear to be unformatted by Windows.

To build a bootable CD, use your CD burning software to create an image from the unzipped ISO file.

Since Memtest86 is a standalone program, it does not require any operating system support for execution. It can be used with any PC regardless of what operating system, if any, is installed.

Features

Memory Sizing

This is one of the major features of MemTest85. The BIOS in modern PCs often reserves several sections of memory for its use, and also to communicate information to the OS. It is just as important to test these reserved memory blocks as it is for the remainder of the memory. For proper operation, all the memory needs to function properly regardless of what the eventual use is. Memtest86 tests these reserved areas of memory.

Testing Algorithms

The algorithms resort to a set of nine different tests that have been arranged in an order to detect the maximum errors in the minimum time.

How to use it

Memtest86 needs to be run for several hours to fully evaluate the RAM. The best way to use the system is to set it up to run overnight, for a fully rigorous test. This will allow Memtest86 to run long enough to achieve full (read: 100 per cent) coverage, and identify RAM that frequently corrupts the data written to it.

If Memtest86 finds an error, it will stop and report it. If there is an error, you should consider replacing your RAM, or at the very least, verifying that your machine is correctly configured.

5.2.2 Prime95 (www.mersenne.org/freesoft.htm)

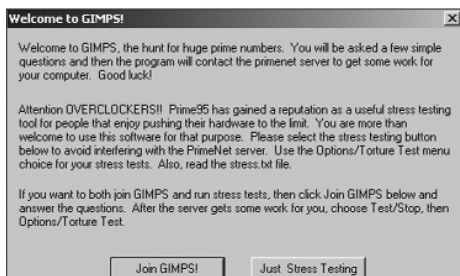
Prime95 has been designed as a part of GIMPS, a distributed computing project dedicated to finding new Mersenne prime numbers. As of September 2006, ten new Mersenne prime numbers have been found. The Linux-based version is called MPrime.

Over the years, Prime95 has become extremely popular among PC enthusiasts and overclockers as a stability testing utility. It includes a “Torture Test” mode designed specifically for testing PC subsystems for errors in order to help ensure the correct operation of Prime95 on that system. Now, the functional running of Prime95 is such that it effectively stress-tests a PC.

The stress-test in Prime95 can be configured to better test various components of the computer by changing the Fast Fourier Transform (FFT) size. Small and In-Place modes primarily test specific components of the CPU, whereas the Blend mode tests everything, including the memory. Then, for the more advanced and willing user, there is the Custom mode that allows you to customise the system.

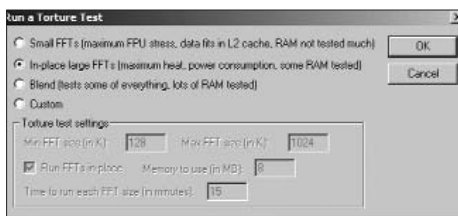
Prime 95 is designed to subject the CPU to an incredibly intense workload, and to halt when it encounters even one minor error. Unlike other benchmarking software, it does not continue operations with errors.

Since the original purpose behind the software has been to search for prime numbers, it

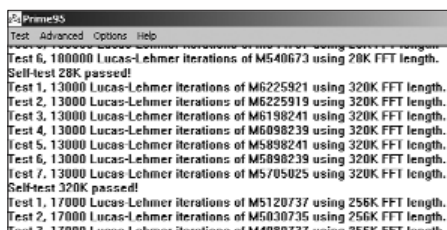


Prime 95 gives your system the acid test

has been designed as a distributed program (that is, it spreads the work among large numbers of computers to find the prime numbers). For stress-testing the system, the user needs to click on the “Just Stress Testing” button when running the program for the first time.



It's even called the Torture Test!



Who's the biggest prime of all?

To test the computer, run Prime95 and click the Options menu and then select “Torture Test”. Then select a test and click OK. Run the test for a few hours.

If you want to be thorough, then let it run for 24 hours. To stop the test, click the Test menu and then click Stop.

Prime95 checks its calculations against known results, so if something goes wrong it will stop automatically. It's also been known on certain occasions to crash unstable machines. If it crashes or finishes with an error, then there is a problem with your hardware.

5.2.3 SystemTap GUI (<http://sourceware.org/systemtap>)

SystemTap simplifies the gathering of information about the running Linux kernel, and therefore, assists in the diagnosis of performance or functional problems. It eliminates the otherwise tedious and detailed sequence of work to collect data.

SystemTap comes with a simple command line interface and scripting language. SystemTap in its current state of development

is a useful tool for developers. The latest SystemTap GUI makes it more user-friendly for Linux.

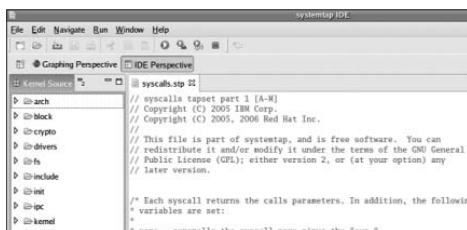
SystemTap GUI is a fully-featured IDE, including many tools intended to ease in the development of SystemTap Scripts. This application requires GTK+ version 2.2.x and Systemtap JRE (these are available from the Web site for download).

5.2.3.1 SystemTap Browsers:

The SystemTap GUI has three browsers:

Probe Alias, Function, and Kernel Source. The Probe Alias and the Function browsers allow the user to view Tapset code. (A

Tapset is a set of functions in a given kernel subsystem that exports data about that system.)



Deconstruct your Linux kernel with SystemTap

The Kernel Source Browser allows the user to navigate and view kernel source files, and click on a specific line of code in the kernel source file that they wish to probe. The IDE will generate a skeleton probe for the requested line of kernel source.

5.2.3.2 The Editor

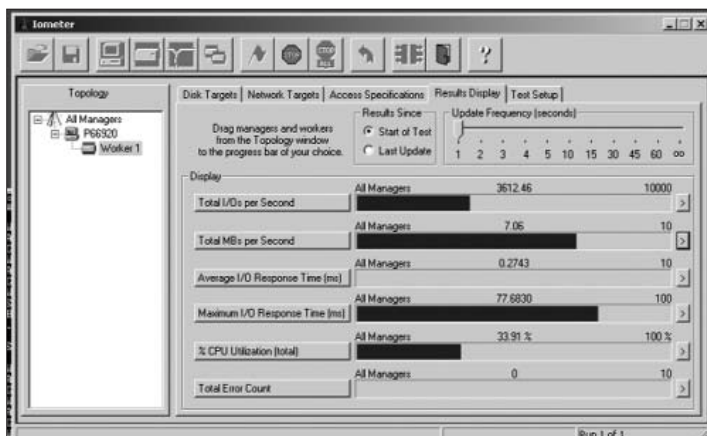
The SystemTap GUI's IDE has a full-featured editor for the SystemTap language. This editor includes context-assistance, suggesting completions for probe aliases and functions as the user types. The editor also provides syntax highlighting for the scripting language.

5.2.3.3 Graphing

SystemTap GUI also has visualisation tools, allowing you to see your data. The program can generate multiple types of graphs from arbitrary SystemTap scripts, including line charts and histograms.

5.2.4 IO meter

(<http://www.iometer.org>)



IOmeter checks how fast your devices talk to the OS

IO meter evaluates the performance of the I/O subsystem and acts as a characterisation tool for single and clustered systems. It was originally developed by Intel; now, Intel has discontinued to work on IOmeter, and it is being maintained by the Open Source Development Lab (OSDL).

IOmeter consists of two programs, IOmeter and Dynamo.

1. IOmeter is the controlling program. It has a GUI and it tells Dynamo what to do, collects the resulting data, and summarises the results in output files. Only one instance of IOmeter should be running at a time, and therefore, it is typically run on the server machine.

2. Dynamo is the workload generator. It has no user interface. At IOmeter's command, Dynamo performs I/O operations and records performance information, then returns the data to IOmeter. There can be more than one copy of Dynamo running at a time. Typically, one copy runs on the server machine, and one

additional copy runs on each client machine.

Installing IOMeter

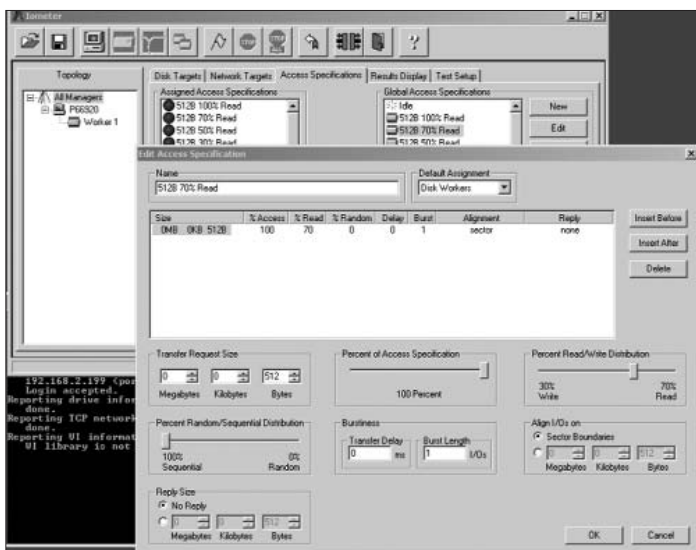
After downloading the package, uncompress the files, and place the files IOMeter.exe and Dynamo.exe in the same directory. If you want to run Dynamo on multiple machines, Dynamo.exe must be available on each machine (on either a local or networked disk).

In such cases, a properly-configured TCP/IP network must be provided between the systems on which IOMeter and Dynamo are to be run. No network is needed if IOMeter and Dynamo are run on a single system.

Running IOMeter

To run IOMeter, double-click on IOMeter.exe. The GUI appears, and IOMeter starts one copy of Dynamo on the same machine. IOMeter undertakes tests to assess:

1. Disk performance



Configuring IOMeter

2. Network performance between two computers (A and B)

The interface

It provides a tabbed interface to control the various parameters of the test. The different tabs to control the parameters of the test:

1. Disk Targets tab: Specifies the disks used by each disk worker.
2. Network Targets tab: Specifies the network interfaces used by each network worker.
3. Access Specifications tab: Specifies the type of I/O operation each worker performs to its targets.
4. Results Display tab: Displays performance data during the test.
5. Test Setup tab: Specifies the tests to be performed in a test series.

The IOMeter Web site is very informative, and well-designed to assist the user.

5.3 Compression

Claim back disk space and reorder your files with the various compression tools reviewed here!

5.3.1 BZip2

(<http://gnuwin32.sourceforge.net/packages/bzip2.htm>)

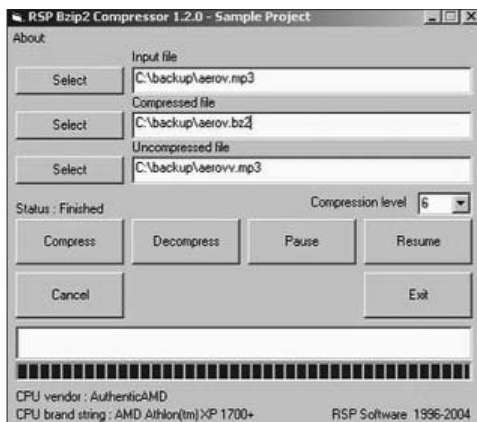
bzip2 is a freely available, patent-free, high-quality data compressor. It claims to compress files to within 10% to 15% of the best available techniques (the PPM family of statistical compressors), while being around twice as fast at compression and six times faster at decompression.

It compresses most files more effectively than the traditional gzip or Zip, but is slower. This does not come with archiving functions, as bzip2 is only a data compressor. The program itself has no facilities for multiple files, encryption or archive-splitting. It instead relies on separate external utilities such as tar for these tasks.

bzip2 uses transforms and Huffman coding to encode data. The blocks are all the same size in plaintext, which can be selected by a command-line argument, and are marked in compress text by a bit sequence derived from the decimal value of pi.

Features

The interface is very simple, and almost self-explanatory. This version is simply for compression and decompression of *.bz2 files and does away with many functionalities of the command line version. The newer version is expected to implement all the features found in the command line version.



Bzip is one of the best compression tools out there

5.3.2 ZipGenius (www.zipgenius.it)

ZipGenius lets you compress files to almost any kind of archive. It supports more than 20 compressed archive formats, including CD/DVD-ROM image files, RAR, ARJ, ACE, CAB, SQX, OpenOffice.org documents and 7-zip. It can also pre-compress executable files going to be added to a ZIP archive.

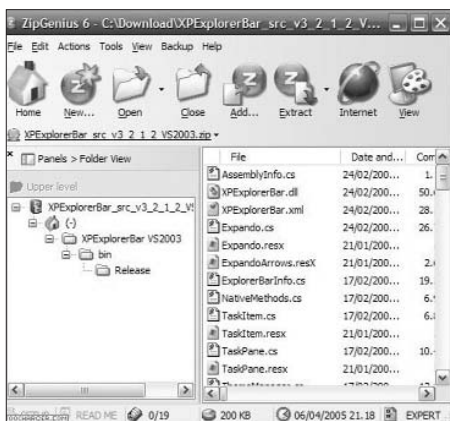
Installation

The download is in the form of an .exe file. Click on the file to start the basic installer, and follow the prompts. The program links to the file managers by default, and will associate itself with compression files on the system. This can be adjusted in the program via the Tools / Options.

The interface

The layout of ZipGenius has the XP look. There are quite a few options to change the look such as large icons, grid separation, filters, folders split view, and more.

The display is very orderly and has been designed in a systematic fashion. The Options area is found in the Tools menu, and gives plenty of options to customise it.



ZipGenius comes with the XP look

A great feature of ZipGenius is the window showing the statistics of the files you might be working with. The display features pie charts listing the least and most compressed file in the archive, as well as medium compression, folders and required disk space.

ZipGenius places a small icon in the task bar, associates itself with your compression files on your computer, and places menu choices when you right-click in your file manager.

Features

ZipGenius is loaded with lots of great features that make working with compression files a breeze. It comes complete with the "First Step" feature, which can be accessed easily by using the [F1] key. From here you can pick exactly which process you wish to perform, and the Wizard will guide you through the whole process. The entire process is fully explained and the final compression process is really fast.

It can make .exe files, and carry out multivolume compres-

sion. The Expert Layout feature gives added choices, auto signature and commenting. Then there is Cryptozip—a tool to encrypt compression files.

Another feature is the presets for actually making backups of your most important directories and files on your system. Clicking the Backup menu area shows choices like Windows Registry files, etc., and it has a small, simple and effective inbuilt FTP program.

5.3.3 7-Zip

(www.7-zip.org)

7-Zip is a file archiver with a very high compression ratio. The compression ratio is claimed to be 2–10% better than the ratio provided by PKZip and WinZip. It integrates fully with the Windows environment. Its 7z format files have self-extracting capability.



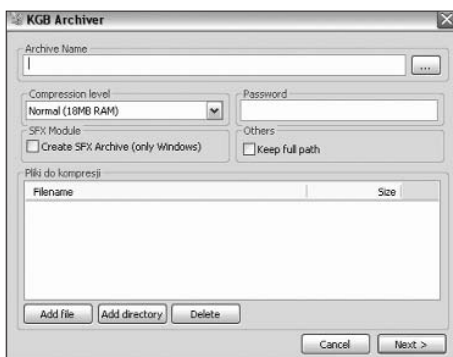
7-Zip works in Windows 98/ME/NT/2000/XP. There is a port of the command line version for Linux/Unix. 7-Zip (except for the file Rar29.dll) is free software distributed under the GNU Lesser General Public License. The file Rar29.dll is under a mixed license, as it is used to re-create the RAR compression algorithm, which is proprietary.

The interface gives a very comfortable feel. It is well-laid out, and almost explanatory about its usage. Excellent for novices.

Compression ratio results are dependent upon the data used for the tests. Usually 7-Zip compresses to 7z format 30–70 % better than the Zip format. And 7-Zip compresses to Zip format 2–10 % better than most other Zip-compatible programs.

5.3.4 KGB Archiver

KGB Archiver stands true to its name. The compression tool has an unbelievably high compression rate. It surpasses even such efficient compression tool like 7-Zip and UHARC in terms of the abilities. Unfortunately, it has high hardware requirements (a processor with 1.5 GHz clock, and 256MB of RAM as an essential minimum).



KGB Archiver can take ages, but compresses well requirements (a processor with 1.5 GHz clock, and 256MB of RAM as an essential minimum).

One of the advantages of KGB Archiver is the AES-256 encryption standard that it uses. This is one of the strongest encryptions known, and archive contents are additionally encrypted using this.

The installation of KGB Archiver is easy and intuitive. Place the program files where you want them, and begin the process. The final part of the install lets you customise the KGB Archiver settings. This lets the user set the file associations; besides, one can add KGB Archiver to the Explorer context menu.

KGB Archiver can make self-extracting, AES protected, compressed files.

5.4 CD/DVD Writing

There are many commercial tools for CD/DVD writing, and prominent among them are Nero and Roxio. Certain operating systems come with in-built CD-Writer software. Yet, the open source software enjoy an unparalleled base because of the features and ease they offer across multiple platforms.

5.4.1 burnatonce

(<http://burnatonce.net>)

BurnAtOnce claims to be the first freeware CD/DVD authoring tool on the Win32 platform. Actually, it's a front-end to various high quality components: cdrdao, ddump, mad (mpeg audio decoder), etc.



BurnAtOnce—first on the block

BurnAtOnce has a slick interface and good basic features. The user can create audio and data discs, read discs to image files, burn image files (.bin/.cue., .iso), and erase CD-RW discs. It can also handle DVD discs, which requires the installing of a free but time-limited third-party software. The software supports multi-session burning, bootable discs, and most prevalent file formats. It comes with an audio file converter for MP3 to Audio CD etc.

It is an interesting project in its early stages of development. Even in its current state, it is a very snappy tool for doing some basic CD-R tasks, and most importantly, it is free.

5.4.2 Burrn

(www.burrrn.net)

Burrrn is a little tool for creating audio CDs with the content from various audio files. The supported formats are wav, mp3, mpc, ogg, aac, mp4, ape, flac, ofr, vv, tta, m3u, pls and fpl playlists and cue sheets. Burrn can read all types of tags from all these formats.

Burrrn uses cdrdao.exe for burning. The user needs to



Get ready to burrrn!

have the corresponding decoding executables and `cdrdao.exe` to be in the same directory as `Burrrn`. All the necessary files are included in the installation set and are installed as required by default.

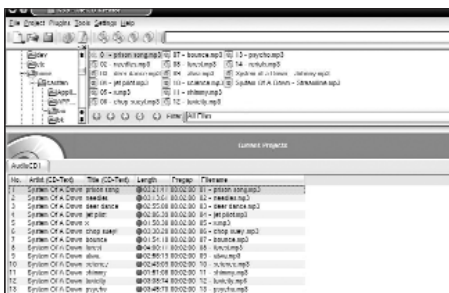
To “burrrn” a CD, just drop the audio files, playlists or cue sheets on the list, select the writing speed, and press `Burrrn`. A window will pop up, where one monitor progress.

The user can customise the burning, coding and decoding processes from the Settings.

5.4.3 K3b—The CD Creator for KDE

K3b is a free CD and DVD authoring application for GNU/Linux and other Unix-like operating systems designed for the **K Desktop Environment**.

It provides a GUI for creating data and audio discs from sets of files. It can also perform direct disc-to-disc copies. The program has many default settings which can be customised by more experienced users.



K3b has a good GUI for the command-line utilities

The disc recording in K3b is done by the command line utilities `cdrecord`, `cdrdao`, and `growisofs`. GNU `VCDImager` is required to prepare video discs (VCD and DVD) from MPEG video files.

Usage

The interface is really cool, and well laid out.

1. When you start K3b you see a window with various options to choose.

2. To make an audio CD, click on “New Audio CD Project”.

The files at the top part of K3b can be dropped with the mouse to the bottom widget. Another way is to right-click on a file and select Add to Project. In order to rearrange the order of the audio-tracks you can simply move the tracks with the left mouse-button. The properties of the tracks can be changed by clicking with the right mouse button and choosing Properties.

3. As soon as the arrangement of the tracks is done, click on “Burn...” in the right-bottom corner. A new window pops up. Here, you can control the settings of the burning itself.

4. You can give the CD a title by choosing CD-Text and selecting Write CD-Text, for example, Title and Performer. As soon as you are content with the settings, click on Burn.

5.4.4 ISOBurn for Windows

IsoBurn provides a lightweight, easy-to-use interface for the burning tools found in the Windows Resource Kit.

Features

The user drags and drops ISO images and burns CD/DVD from them. Before burning, it gives users the option to Erase as well. The interface is quick and clean. It is a very light utility, and easy to manipulate.



ISOBurn—nice and simple

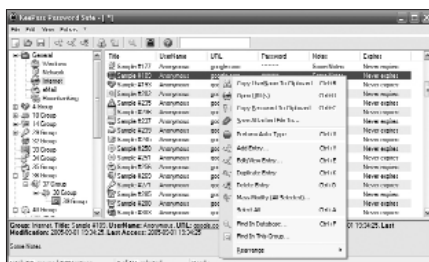
5.5 Password Management

Security and authenticity are gaining increasing importance across the spectrum of life—personal and business, alike. With this the focus naturally has to be on the tools that make it possible for us to protect our critical and vital information and documents. Here, we look at some of the most prominent players in the password segment of open source movement.

5.5.1 KeePass Password Safe (<http://keepass.sourceforge.net>)

KeePass databases are encrypted using the much-respected AES and Twofish symmetric ciphers. Passwords are hashed using SHA-256, and kept in an encrypted form in the KeePass process memory. The rationale is that even if Windows caches the KeePass process to disk, the user's passwords wouldn't be revealed.

The tool is the first password management utility that uses security-enhanced password edit controls. None of the available password spies work against the controls used in KeePass. The passwords entered in these controls aren't even visible in the process memory of KeePass.



You can even carry KeePass on a USB disk

The working scheme of KeePass is really novel. One master password decrypts the complete database. Alternatively, you can use key-disks, as they provide better security than master passwords in most cases. For even more security one can combine the above two methods: the database then requires the key-disk and the password in order to be unlocked. Even if you lose your key-disk, the database would remain secure.

Portability

The application doesn't need to be installed. KeePass provides an installer that automates the creating of links in the Start Menu. There is also a binary zip package which contains only the main executable. This executable runs without installing anything.

KeePass doesn't store anything on your system. The program doesn't create any new Registry keys, and it doesn't create any initialisation files (.ini) in your Windows directory. Deleting the KeePass directory (in case you downloaded the binary zip package) or using the uninstaller (in case you downloaded the installer package) leaves no trace of KeePass on your system. KeePass runs without downloading any additional libraries, on Windows 95, 98, 98SE, ME, NT, 2000, XP, 2003 and Vista.

Features

1. Import/Export

The password list can be exported to various formats like TXT, HTML, XML and CSV. It can import TXT files created by Bruce Schneier's Password Safe v2.

2. Password Management

The user can create, modify and delete the groups in which passwords are sorted into. The groups can be arranged as a tree, the tree can have sub-groups, and so on.

3. Auto-Type, Global Hot Key, Drag-n-Drop

When KeePass is running in the background (with an open database) and the user presses the hotkey, it looks up the correct entry and executes its auto-type sequence.

4. Built-In Password Generator

KeePass features a built-in password generator that generates strong random passwords for you. The user can define the possible output characters of the generator.

5. Plugins

KeePass has a plugin architecture. However, the plugins may compromise the security of KeePass.

5.5.2 Password Safe (www.schneier.com/passsafe.html)

Password Safe is a program for storing passwords under Windows. The program is now maintained by a group of volunteers.

Password Safe features a simple, intuitive interface that lets users set up their password database in minutes. After filling in the master password the user has access to all account data entered and saved previously. The data can be organised by categories, and can be sorted and searched.

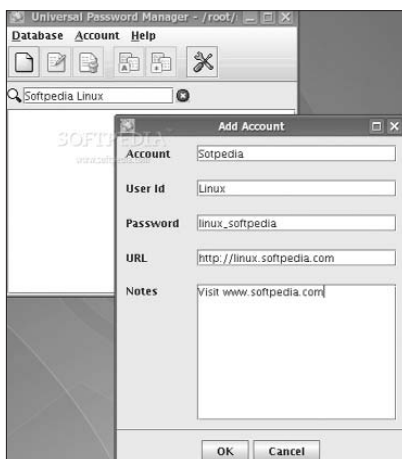
The key combination [Ctrl] + [C] copies the password of a selected account into the clipboard, [Ctrl] + [U] copies the user ID. The program can be set to minimise automatically after a period of idle time and clears the clipboard.

5.5.3 Universal Password Manager (<http://sourceforge.net/projects/upm>)

Universal Password Manager allows you to store usernames, passwords, URLs and generic notes in an encrypted database protected by one master password.

It's main features are simplicity and cross platform support (Java/SWING).

Universal Password enforces uniform password policy across multiple



Manage anything with UPM

authentication systems (such as Native File Access). Universal password also manages multiple types of password authentication methods from disparate systems. This is done by creating a common password that can be used by all protocols to authenticate users.

5.5.4 KeePassX

(<http://keepassx.sourceforge.net>)

KeePassX is an application for people with extremely high demands on secure personal data management. It has a light interface, and is cross-platform.

KeePassX saves many different information, for example, user names, passwords, URLs, attachments, and comments in one single database. The user can define titles and icons for each single entry, or sort the entries into groups, which are customisable as well. The integrated search function allows to search in a single group or the complete database.



KeePassX—perfect for the paranoid

KeePassX comes with a utility for secure password generation. The generator is very customisable, fast, and easy to use. People who require or like to have their password change frequently will appreciate this feature.

The complete database is always encrypted either with AES or Twofish encryption algorithm using a 256 bit key. Therefore, the saved information can be considered secure. KeePassX uses a database format that is compatible with KeePass Password Safe.

Features

1. Customisable management of data and passwords
2. Search function to search either in specific groups or in complete database
3. Database security with password/key-file/both access only
4. Automatic generation of secure passwords and a quality indicator for chosen passwords
5. Upcoming features are network support with multi-user capabilities and also browser integration.

5.5.5 PasswordMaker

(<http://passwordmaker.org>)

The makers of this tool have come up with an interesting take on The Lord of the Rings. They say, “One password to rule them all.”

This is a small, lightweight, free, extension for Internet Explorer, Firefox, Mozilla, Netscape, Flock, and Yahoo! Widgets (a widget is an interface element that a computer user interacts with, such as a window). It creates unique, secure passwords that are very easy for the user to retrieve, but for no-one else. Since nothing is stored anywhere, anytime, there's nothing to be hacked, lost, or stolen.



PasswordMaker generates an untraceable password

How It Works

The user provides PasswordMaker two pieces of information: a master password, and the URL of the site requiring a password. Then using one-way hash algorithms, PasswordMaker calculates a message digest (a.k.a. digital fingerprint), which can be used as the user's password for the Web site.

PasswordMaker claims that the resulting fingerprint (password) does not reveal anything about the input that was used to generate it. This means that if somebody has one of your passwords, even then it is infeasible for him to derive your master password.

Portability

The online version works in all browsers, and it requires no downloads or installations. Standalone versions for desktops, mobile phones, and PDAs are under development.

Installation and start

For Netscape, Mozilla Suite and Mozilla Firefox users, the install is done automatically from the company's site when the user clicks on Downloads in the menu (on the right) and then clicks on Browser Extensions. Others need to download the files, and then install it.

For Mozilla and Netscape users, the toolbar icon is installed by default. For Firefox users, the toolbar icon must be manually added by using the View > Toolbars > Customize menu, and then dragging the golden ring icon on to the toolbar.

Once you've opened the extension using one of these methods, you are presented with the Basic Options screen. From here on, the usage is really simple.

6.1 Word Processors

There's no doubt that word processors are among the most popular and widely used software in the world. Most people unfortunately haven't gone beyond notepad, Wordpad and the ever popular MS Word. In our travels across and around the Web we came up with some really good alternatives.

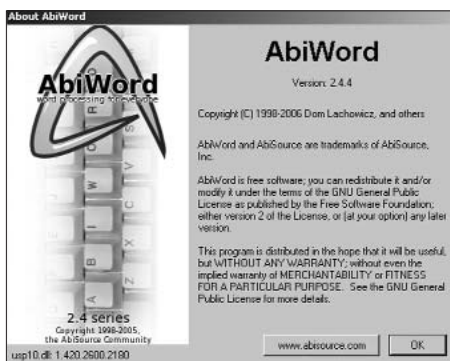
6.1.1 Abiword

<http://www.abisource.com/>

Abiword is one of the more well known word processors available on the Net. It has an impressive feature list that contains most tools and functions that you would require from a word processor.

Not only is the standard feature list impressive but some of the additional features like cross-platform support and multiple format support are undeniably useful. Documents here are saved in plain readable text format with XML markup making them read-

able by most text editors. The good part though is that you can load and save files in multiple formats using what are called 'importers' and 'exporters' which are basically plug-ins which give the program a lot of flexibility. Abiword currently supports MS-Word, RTF (Rich Text Format) and also HTML along with a couple of Abiword's own formats. Being an Open Source project new plug-ins are bound to be under development so be sure to keep checking for additional plug-ins. System requirements are minimal and the loading time miniscule. Altogether, Abiword is a very useful piece of software and deserves the many awards that it has got over the years.



Abiword is a cross platform word processor

6.1.2 Lyx

<http://www.lyx.org/>

Lyx is an interesting concept that distances itself from the more generic ‘word processors’ by calling itself a ‘document processor’. The subtle difference of course is because Lyx is a WYSIWYM word processor—*What You See Is What You Mean*. While the standard set of word processor features already exist it’s the extended set that is really interesting. It features various text classes for articles, slides, books, etc., and also for different scientific societies like IEEE. Multilingual support and a large number of templates which can also be added as plug-ins also exist. Lyx also features an inbuilt formula editor for all those scientific equations. Automatic formatting and a large number of other automated tasks complete the already impressive package.

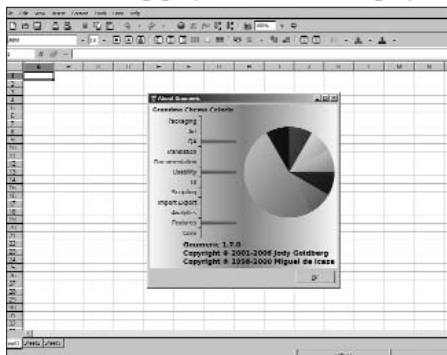
6.2 Spreadsheets

There is no doubt that Excel and spreadsheets have become synonymous so much so that they were actually being used in place of each other. Gnumeric, though, is one program that plans to change that trend.

6.2.1 Gnumeric

<http://www.gnome.org/projects/gnumeric/>

Gnumeric is part of the GNOME desktop project. The GNOME project aims to develop a desktop environment that is free, intuitive and at the same time attractive. The developers claim, rather bravely, that Gnumeric has all the features that Excel offers plus 154 more! Though we didn’t count the exact numbers we do agree that



Gnumeric - more features than Excel?

there are a lot of features on offer. Gnumeric also has the ability to import and export data and a variety of different formats that include Excel, Lotus 1-2-3, Quattro Pro, OpenOffice.org and its very own Gnumeric file format among others.

Mainly meant for the Linux/Unix platform ver 1.6.0 is also available for Windows and it's definitely an alternative worth trying out.

6.3 PDF Tools

The Portable Digital Format has gained enormous popularity in recent years. Its inherent properties of being device independent and usable across multiple platforms have been the main reasons behind its success. The following are some tools which are used for creating and manipulating PDF files.

6.3.1 PDFCreator

<http://www.pdfforge.org/>

PDFCreator is a tool that can be used for creating PDFs from any Windows application with a simple “print” command. Security features such as encryption are also provided for your documents. Other than PDFs you also have the ability to create other file types including PNGs, JPEGs, TIFFs among others. Overall, a very handy tool.

6.3.2 Doc2pdf

<http://doc2pdf.sourceforge.net/>

Doc2pdf is a very interesting piece of software. It was created mainly due to one man's frustration caused by people sending him Microsoft Office attachments on his Linux machine. What this little piece of code does is convert every MS Office attachment in your Inbox into a PDF file. Behaving much like an e-mail robot, it goes about its task in a very systematic manner. A useful tool for all you frustrated Linux/Unix users!

6.3.3 GhostWord

<http://ghostword.sourceforge.net/>

GhostWord is another application that converts MS Office docu-

ments into PDFs. It works on the same principle as the PDFCreator and has a similar set of features.

6.4 Personal Information Managers

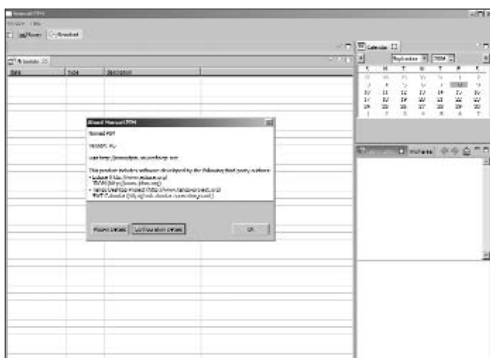
Personal Information Managers (PIMs) are tools that help you organize various different types of personal data and therefore are actually quite handy. The usual standard feature set includes an address book, calendar, diary and reminder. Different PIM's usually provide variations and additions to these features.

6.4.1 Nomad PIM

<http://www.nomadpim.org/>

Nomad PIM is an impressive application which though still in its development stages impresses with its wealth of features.

The latest build that we tested was R6 and it has all that you would expect from a PIM including notes, schedules, contacts, events, etc. Though certain features are limited, development is still on. This is definitely an application you should keep your eyes on.



Nomad PIM is still being developed

6.4.2 Mozilla Sunbird

<http://www.mozilla.org/projects/calendar/sunbird/>

Sunbird is a standalone application created by Mozilla—the makers of the ever popular Firefox. The first thing that you would probably notice is the beautiful logo that represents the Sunbird.

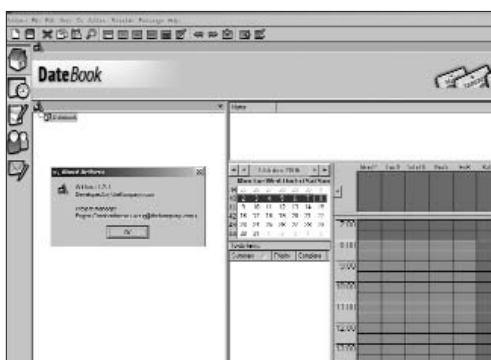
The developers had actually asked for suggestions for the logo from its users and it looks like it worked. Sunbird is basically a calendar and scheduling program with the ability to add different tasks and event as well as alarms based on these events. You also have the capability to modify the views according to your personal preference.

Sunbird is a cross platform application which is based on the XUL user interface language. You should however be aware that right now there is no integration capability between Sunbird, Firefox and Thunderbird.

6.4.3 Aethera

<http://www.thekompany.com/projects/aethera/>

Aethera is a PIM application which also handles e-mails. It starts off with a simple setup for the first time user and you'll have to enter various setting for accessing your e-mail. Aethera supports POP3 and IMAP



The refreshingly nice interface of Aethera

among others and provides for easy synchronization. You'll be pleasantly surprised by the clean and lively interface. The icons are big and functions easily accessible. The software also provides groupware capabilities through the Kolab server. It also features an instant messaging client using Jabber with the ability to share different types of documents. Different plug-ins with varying functionality can also be applied to Aethera. Unfortunately though, some of these plug-ins aren't free and you have to buy them if you want to use them. Overall, this is one of the most complete PIM applications that we have come across.

6.5 Collaboration

Collaboration software has of recent gained vast popularity. The ability of people, located at physically distinct locations, to collaborate on a common platform and perform tasks as if they were actually physically present at the same location is made possible only through collaboration software. These applications provide the means to share data, perform tasks and track projects from different locations.

Some of the collaboration software available are Zimbra, Netoffice, Egroupware and phpcollab.

6.5.1 Zimbra

<http://www.zimbra.com/>

Zimbra Collaboration Suite is one the more popular Open Source collaboration tools available on the Net, providing solutions for the Mac and Linux platforms. Developed around AJAX-based collaboration, it integrates a powerful web client, e-mail, contacts, calendar, VoIP as well as online document authoring and sharing.

6.5.2 Egroupware

<http://www.egroupware.org/>

Egroupware is a platform independent, enterprise ready groupware software/server. Its features include the ability to manage contacts, appointments and more for the whole business. It comes with a web interface which allows you to access your data from anywhere in the world. You also have the choice of using your own client, be it Evolution, Kontact or Outlook and even your mobile phone/PDA.

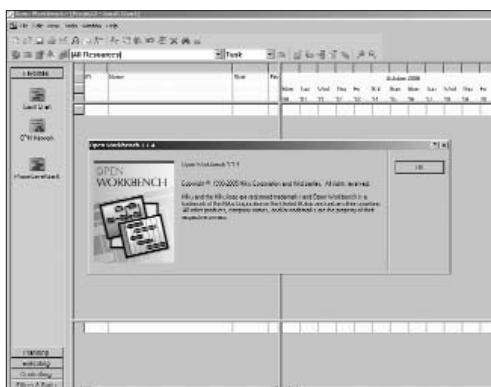
6.6 Project Management

Project management tools are essential tools that are required for various Industries. The resource management tools which are a part of the package provide an easy means of displaying required data and therefore helps the user come up with decisions faster. Some of these applications also provide project scheduling functionalities that keep you informed on progress and deadlines.

6.6.1 Open Workbench

<http://www.openworkbench.org/>

Open Workbench is an advanced project management tool. It shares a lot of functions with Microsoft Project but with some fundamental differences. Some of the shared features include the ability to create a number of levels for the Work Breakdown Functions.



The very advanced and feature filled Open Workbench

You can also create interdependencies between projects as well as interdependencies between tasks within a project. Actuals, ETC's (That's Estimated time of completion), task status and % completion are some the ways to judge the progress of various projects. You also have the option of creating different views according to your managerial style. The fundamental difference though is that while Open Workbench is driven by resources MS Project is a task driven application. Open Workbench also schedules tasks based on resource availability. Overall, an excellent package with immense usability.

6.6.2 Achievo

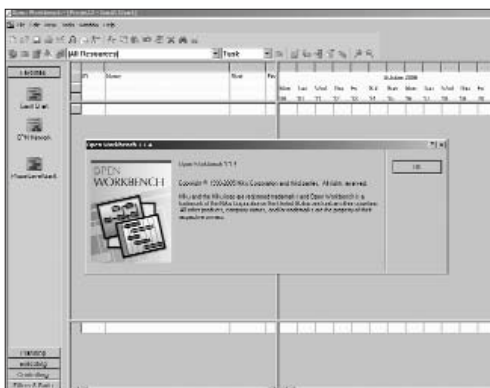
<http://www.achievo.org/>

Achievo is a web based project management tool meant mainly for small and medium size businesses. Though you probably won't find many of the features available in Open Workbench here, you might actually discover that you don't really need them either. It does though have features like project planning which includes planning from the initial to the current stage. It also includes notes, charts and templates. CRM as well as Human Resource Management features are also present. A calendar and useful PIM features complete the whole package.

6.6.3 GanttPV

<http://www.pureviolet.net/ganttpv/>

GanttPV is another simple, Open Source, project management tool. Though simple it features a number of useful tools for project management. Here too you can define interdependencies as well as tasks and their duration.



GanttPV is a good project management tool

Based on the data that is entered it generates Gantt charts which gives a graphical overview of the whole data. GanttPV can also be used to monitor productivity as well as expenses.

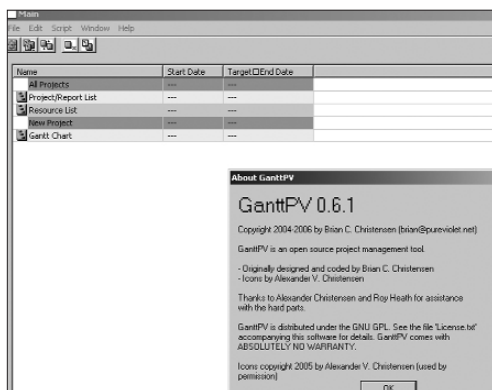
6.7 Accounting

Gone are the days of ledgers and registers. The new age of accounting is done on the PC. And a good way to balance those accounts is by using one of the following Open Source alternatives.

6.6.1 Grisbi

<http://www.grisbi.org/>

Grisbi is basically a personal accounts manager. It is a simple and easy to use application and has features for all types of users. It has the ability to handle multiple accounts and currencies and transactions can also be scheduled.



Grisbi is a simple and easy to use application

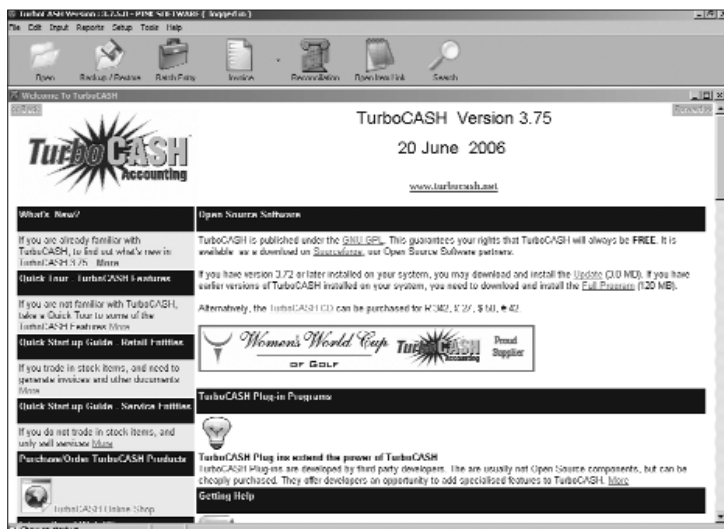
Budgetary lines and reports are also supported.

It's a decent package with enough useful features for the individual user.

6.6.2 TurboCash

<http://www.turbocashuk.com/>

TurboCash is one the world's foremost Open Source accounting packages. It has a huge set of features with a number of wizards to ease the process. Mainly meant for handling accounts of small and medium size businesses it goes about its tasks very well. It can handle around 999 sets of books, accounts and sub accounts and up to 40000 debtor and creditor accounts as well. It can also handle stock items with the ability to create your own invoices. It also has a number of security features which allows you to specify dif-



TurboCash is a very popular accounting software

ferent levels of access. You also have the ability to export your books onto the net through the software.

6.8 OpenOffice.org

OpenOffice.org is an office suite application and one of the biggest threats to the Microsoft Office Suite. A conservative estimate suggests that it holds around 10 per cent of the office suite market (the rest of course held by MS Office) with over 30 million downloads. The project started off using the code base provided by StarOffice and really took off from there.

Now though the tables have turned and many of the features present in StarOffice have been borrowed from OpenOffice.org. The OpenOffice.org Suite consists of mainly 6 components i.e. Base (database manipulator), Calc (spreadsheets), Draw (graphics), Impress (presentations), Math (for mathematical equations) and Writer (the word processor). Let's take a look at each one individually.

6.8.1 Writer

Writer is the word processor of the OpenOffice.org Suite. The first thing that you would notice when you start the word processor is the similarity in the look and feel of Writer to MS Word. It's clear that the developers have based this, and as you'll see, the whole Suite on Microsoft's bestselling Office which actually isn't such a bad thing. It has all the features that you have come to expect from a word processor and more. The wizards provided, which are basically templates and other commonly used tasks, are useful and you also have the ability to create your own templates. Document converter and Euro converter are nice touches too. Other features include the ability to publish your work directly into the PDF format or export it to the web in HTML. You can also create tables and other objects. The list doesn't end here and there are truckloads of features which you'll discover as you use the Writer more. Compatibility issues are not issues anymore thanks to Writer's ability to open and save documents in Word's format. You also have the ability to save your work in the OpenDocument Format which means that your document can be opened by any program that supports the OpenDocument format.

6.8.2 Calc

Calc is the spreadsheet program of the suite. Again if you've used Excel you'll feel right at home using Calc and you'll also probably end up sticking to it. As expected the standard feature set is all there without exception. The extra features though are the ones to check out. The DataPilot function allows you to summarize and rearrange large amounts of data into meaningful tables. The ability to use natural language formulas makes understanding various functions easy. Scenario is another very interesting tool. These basically are aids which help you show various calculations on numbers that are dependent on each other. Templates are present here too and end up being quite useful due to their inbuilt functions. You also have the option of saving your work in the OpenDocument format and also in the PDF format. You can again open and save your documents in Excel format.

6.8.3 Impress

Impress is the program that you would use for making presentations and slideshows and boy would you love it! Again present are all the features you would need and some fascinating ones too. Here you have five different views through which you can see your work including notes and handouts. Also present is an impressive range of animation that you can use for you slideshow. The ever popular Wordart from PowerPoint is also present here under the alias Fontwork. Various drawing tools are also at your disposal and they're pretty simple to use. One feature that stands out is the ability to export presentations to the Adobe Flash format (SWF) so that it can be viewed in any computer with Flash Player installed on it. There is, however, a lack of readymade presentation designs but we have the Internet to tackle that problem.

6.8.4 Draw

Draw is the graphics editor of the package. It's really simple to use and you'll have fun trying out all it has to offer. Draw also provides the ability to use 3D objects and manipulate them through the controller. Rendering capabilities and various effects like texture, lighting, transparency and perspective are sure to excite the advanced user. Even though it is no Photoshop, it is a useful enough application to make flowcharts and other diagrams with enough features in there to keep you occupied.

6.8.5 Base

Base is the OpenOffice.org answer to Microsoft Access. Using Base you can manipulate all your databases. You can also create and modify tables, forms, queries and reports using the HSQL database engine inbuilt into Base. You can also perform simple and complex sorts as also simple and complex queries on your data. Reports in various different formats can also be printed using the Autopilot.

6.8.6 Math

The Math tool is used for creating and modifying complex mathematical formulae. It can be used inside Write or as a standalone. You can also insert it into Calc and Impress as objects.

Along with the features above, you would discover tons of new, useful and advanced tools at your disposal. The reason of course is the Open Source movement which allows lots of minds to work on the same project and thus you would see some really good and fascinating ideas as the outcome. OpenOffice.org is the one of the best software suites available on the net, not only as an Open Source software but also as a software in general. It rivals Microsoft Office in many aspects and almost ends up coming on top in a few departments. The best part of the whole deal is that it's free!

Networking And The Internet



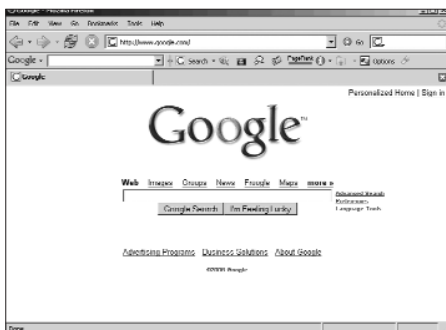
Open source finds a place everywhere in the software world, and browsers with their add-ons, as well as IM clients, are no exception. We take a look at open source applications in these categories. Several of these are considerably better and more functional than their proprietary counterparts.

7.1 Browsers

Browsers are the face of the Internet to most people, and so the primary way of classifying browsers is based on their graphics engine (more appropriately, a layout engine—software that takes Web content and the formatting information and displays the formatted content on the screen). Thus, you have a huge variety of browser engines, and based on them, an amazing variety of browsers.

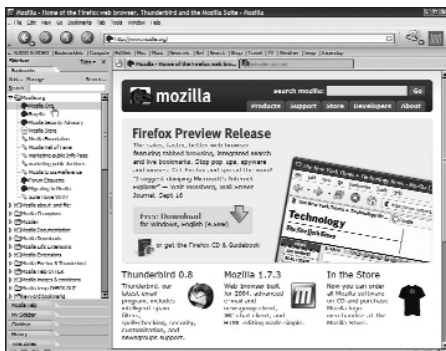
7.1.1 Mozilla Firefox (www.mozilla.com/firefox)

Firefox was developed by the Mozilla Foundation and many developers around the world. It is in many ways the true pioneer of the open source browser movement. It has been responsible for bringing about some of the most radical design and feature changes. As a matter of fact, Firefox has been hailed as the best alternative to other browsers such as Internet Explorer and Apple's Safari.



Mozilla's Firefox Browser

Firefox's integrated pop-up blocker, live bookmarks, and support for open standards makes life easy. The tabbed interface makes surfing multiple sites much less cumbersome than having to open multi-



The Mozilla Sidebar

ple windows. The user can customise the browser with downloadable extensions, a variety of themes and skins, and many preferences (for the advanced user).

Firefox uses SSL/TLS to protect communications with Web servers using strong cryptography. It also supports smart cards for secure login to Web servers. Firefox is considered by many to be safer than Microsoft's Internet Explorer.

How To Use It

Firefox comes with a number of excellent features and extensions.

1. The most useful feature is probably tabbed browsing. It enables the user to open multiple Web pages at the same time in a single browser window. There is also the group bookmarking feature, which enables all bookmarked tabs to be re-opened at one time.

To open a new tab, right-click on a link and select "Open Link in New Tab". Or, type in [Ctrl] + [T]. To customise tabs, on the Menu Toolbar, select **Edit > Preferences > Navigator > Tabbed Browsing**, and then choose your preferred settings.

2. The sidebar is a re-sizeable vertical panel at the left of the browser window. It may contain numerous tabs that you click on to reveal different content in the sidebar panel. It can be customised to add frequently-used items.

Standard sidebars in Mozilla include bookmarks, search, and history. Sidebars provide a very handy way to access these functions. And, with tabbed browsing, the user can middle-click a sidebar link and open it in a new tab rather than overwriting the existing browser window.

3. Themes give Firefox a look suited to the user's personal preferences. The theme selection determines the style of the browser menus, buttons, and other features. The user can obtain new and classic themes from the following sites:

<https://addons.mozilla.org/mozilla/themes/>
<http://themes.mozdev.org/>
<http://themes.freshmeat.net>

All that is required is to download the theme, and then install it as per the instructions.

4. The Form Manager is a very useful feature which allows the user to save information typed into a Web page form, so that it can be used again later without having to re-type the same information. To access the Form Manager select Tools on the Menu Bar.

5. Custom Keywords enable the user to create personal keywords that can be typed into the location bar for quick access to favourite sites.

Select **Bookmarks > Manage Bookmarks**. Here, on the Bookmark Manager, select the required bookmark by right-clicking on it, and then select Properties in the drop-down menu to access the Properties Menu.

Here, type a keyword of choice into the Keyword box in the Properties Menu.



Managing Bookmarks in FireFox

Firefox provides the user with consummate ease of handling and functionality. It is highly customisable, and therefore, fast becoming the browser of choice for many.

6. Extensions give Firefox much of its armoury. Some of the most popular and powerful extensions are:

(a) IE Tab: This is a great tool for Web developers as it allows the

user to see the page displayed in Internet Explorer and then switch back to Firefox. All this at one click. Users will find this useful because some sites are still IE-only, and you won't need to open IE separately to view those pages.

(b) Adblock is a content filtering plug-in. It is more robust and precise than the inbuilt image blocker in Firefox. Adblock allows the user to specify filters, which remove unwanted content based on the source-address. Once the filters are declared, every time a Web page loads, Adblock intercepts and disables all the elements matching the filters.

(c) Flashblock is an extension for filtering Macromedia Flash content on a page. It blocks all Flash content from loading, and leaves placeholders on the Web page that allow the user to click and access the Flash content.

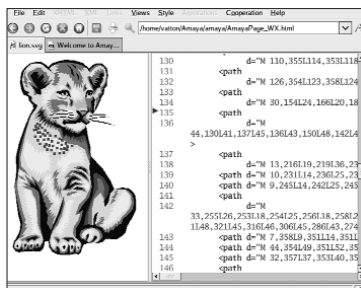
(d) SessionSaver keeps track of the user's browser windows and tabs. It can then restore them exactly as they were during the browser sessions. It saves all details: window positions, tab histories etc. It can also save individual sessions for future recall.

7.1.2 Amaya

(www.w3.org/Amaya)

Amaya is essentially a Web editor, that is, a tool used to create and update documents directly on the Web. However, the browsing features are so seamlessly integrated into the environment that it qualifies as a browser, too.

Amaya is a browser as well as an editor. It has been designed as an active client, that is, the user can use it to create, edit and publish Web sites, as well as retrieve Web



Amaya lets you edit as well as browse

content for viewing. It can also work on a number of files at one time.

Browsing with Amaya is similar to browsing with other Web browsers. For example, the Amaya button bar includes stop, back, next, refresh, home, save, and print buttons, with the only difference that you double-click a link to activate it.

Activating A Link

Since Amaya combines an editor and a browser, the manner of activating a link is slightly different.

A single-click on the link only displays the URL of the link. The link is actually retrieved with a double-click, and if the user wants the link to open in a new window, then it requires a right-click.

If required, this behaviour can be changed through the Browsing Preferences dialog under the **Edit > Preferences** menu. For example, the user can disable double-click link activation option to a single-click operation. Other browsing preferences like the loading of images and the application of CSS can also be controlled in the Browsing Preferences menu.

Moving Backward And Forward

Amaya maintains a history list to keep track of the pages the user has been viewing in the current session. To move backward or forward through pages in the history the user can do so either from the File menu and then Back or Forward, or use keyboard shortcuts [Alt] + [Left Arrow] to view the previous page, and [Alt] + [Right Arrow] to view the next page.

7.1.3 Ghostzilla

(www.ghostzilla.com)

Ghostzilla is a Web browser like Firefox, but shows up and disappears instantly, blending discreetly with the currently running application. The result: Web pages look like part of the application.

Why?

The user gets a browser that is discreet and washed out from ads and unnecessary pictures. The Ghostzilla CD has an additional feature: it runs directly from CD, without installation. While the browsing session is on, the program creates temporary files in the Windows Temp directory. By removing all files on exit it leaves no trace of activity. Only the personal settings (preferences, bookmarks, passwords, history), are stored in an encrypted archive, at the user-specified folder.



Ghostzilla in action

When the user runs Ghostzilla from the CD, it restores/creates a user profile and loads in memory. All that a user can see once it is loaded are its menu bar, address bar, and the Welcome page. To surf, click on the address bar (or press [F6]), type in the address of the Web site, and press [Enter]. Ghostzilla works out the network's proxy settings, therefore there is no need to do any setup. If required, the proxies can be set up by choosing **Setup > Network Proxies** menu option.

The appearance of the page will be grey on white. It does away with pictures.

Hiding

The browser disappears if the user moves the mouse away. The mere act of moving the mouse away lets the original application resume its normal position. This sends Ghostzilla into hiding—an inactive, but listening stage.

Showing

To call the browser back all that is required is a left-right-left movement of the mouse.

Exiting

For this, choose the Exit option, or press [Ctrl] + [Q]. This will completely unload Ghostzilla from memory. Here, it will offer to store the personal settings in an archive, and then remove all the files of the browsing session.

Menu Options

Ghostzilla has a few menu options that are not found in others since it doesn't have a toolbar. For example, Setup allows the user to change the hiding level and network proxies.

Multiple Pages

Ghostzilla enables tabbed browsing. For a new tab, clicking on the New menu option brings up a new tab. To go back to the earlier page, the user needs to click on its tab. To close a tab, the little "x" icon at the right-most corner needs a click.



Tabbed browsing with Ghostzilla

The other way to open multiple pages is to right-click on a link, and select Open in the New Tab option. In Ghostzilla, pop-up windows are disabled.

Ghostzilla promises to add new dimensions to the Web experience. What it does quite simply is to remove all frills—images etc.—from the interface, and then merges the browser interface within the interface of the currently running application.

7.1.4 Konqueror (www.konqueror.org)

Konqueror is a multi-utility software. It combines a file manager, a Web browser, and a file viewer.

The User Interface

Konqueror's user interface looks similar to that of Internet Explorer, but is more customisable. It works extensively with panels, which can be rearranged or added. For example, one click on the Bookmarks panel opens the bookmarked Web page on a larger pane. Panels present an alternate layout for the interface and allow the user to view Web content on different panes.



The Konqueror browser

Konqueror allows browsing the local directory, that is, the user's root directory. This can be done either by entering locations in the address bar, or by selecting items in the file browser window. It allows browsing in different views. These views are arranged similar to Windows Explorer as the views differ in their usage of icons and layout. Files can also be executed, viewed, copied, moved, and deleted.

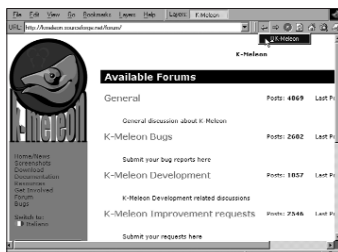
7.1.5 K-Meleon

(<http://kmeleon.sourceforge.net>)

K-Meleon is the bantam-weight champion of the browsers. It is extremely fast, highly customisable, and amazingly light Web browser.

K-Meleon is distributed as a single executable installer which extracts all the files. The download link is <http://kmeleon.sourceforge.net/download.php>

The program keeps a per-session history stack. To see a list of visited URLs, the History



Get help from the K-meleon site

plugin needs to be enabled. The history list may also be viewed by clicking-and-holding or right-clicking on the Back and Forward buttons.

K-Meleon uses Layers for opening multiple Web pages in a single browser window. At any given time, only one page is visible in the window. The other pages are on layers that are conceptually either “under” or “over” the visible page. The user can change the page by clicking on the desired layer in the Layers Menu, or by using the Layers Toolbar if it is activated. The various plugins can be activated or deactivated as required.

The browser allows the user to modify the interface by adding and removing menu items from the menu bar. This ability is built right into the browser preferences.

7.2 Browser Add-Ons

Web browser add-ons are designed to enhance the functionality of the browser to make browsing more effective and entertaining—for example, extra toolbars.

7.2.1 McAfee SiteAdvisor Plug-in for Firefox (www.siteadvisor.com/download/ff_preinstall.html)

The greatest hazard to information privacy is the ignorance of the user, espe-



McAfee's SiteAdvisor plug-in

cially in case of spyware. Inadvertently, any person may run across the privacy-compromising software. To help keep such online nuisances at bay, McAfee has come out with this tool. This tests the safety of different Web sites, then ranks them as safe, questionable, or potentially dangerous.

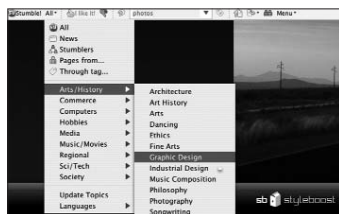
Once the tool has been installed, the user will have access to the McAfee safety ratings via a small icon at the bottom of the browser. The button will turn red if the user is visiting a potentially hazardous site. It also displays its ratings next to Google and Yahoo! search results, so that people can avoid unsafe Web destinations.

The SiteAdvisor Web site explains it all, and it is very easy to install the plugin.

To configure the plugin to allow particular Web sites, click on the Edit Options button. An “Allowed Sites” window will appear. You then type the address of the site (such as www.siteadvisor.com) into the address box. Then, click on the Allow button, followed by Close. Thereafter, you will need to close all browser windows, and start over.

7.2.2 Stumble Upon (www.stumbleupon.com)

StumbleUpon allows the user to surf through the best-reviewed sites on the Web. It is a collaborative surfing tool for browsing, reviewing, and sharing information about Web sites with like-minded people. This brings up some really interesting Web site surprises.



The StumbleUpon plug-in

StumbleUpon works like this: the first time it is launched, the user specifies his areas of interest thereby setting the search criteria of the software. Every time the user makes a search, StumbleUpon returns relevant results according to the user's focus area. The user has the option of ranking the Web content that he comes across through the tool. As this happens, StumbleUpon keeps on updating its search parameters. This ensures that the user always gets what interests him.

7.2.3 Mouse Gestures

(<https://addons.mozilla.org/firefox/39/>)

This software is like a piece of art. It allows the user to execute common commands (like page forward / backward, close tab, new tab) by mouse gestures drawn over the Web page. Yes, all this without using the toolbar or the keyboard a single time.

The user can also use click-only “rocker” gestures, which are even faster than drawn gestures. This is something similar to setting a set sequence of mouse clicks to which the browser responds. For example, the user can set three repeated mouse clicks as a command to refresh the page.

7.3 Instant Messaging

7.3.1 Miranda Instant Messenger

(www.miranda-im.org)

Miranda is a multi-protocol instant messaging application for Windows which scores through its simplicity. It supports plugins to enhance its functionality. In fact, plugins are responsible for supporting the IM protocols and additional features. There are some plugins that come bundled by default while the user can download the others from the Miranda IM Web site. This keeps Miranda lean and fast. There are currently over 500 plugins for Miranda!

Miranda can be customised in its look and function according to the individual's preferences. This is due to its flexible design. Buddy management is convenient because of the inbuilt features such as contact renaming as well as plugins such as QuickSearch, which simplify the organisation of contacts. The buddies may even be on different networks.

It maintains a record of all instant messages, and can recover them at a later time. Besides, they can be deleted automatically or manually with either the DB Tool or the History Sweeper plugin. Miranda can be configured to display photos or contact details

when the mouse cursor is placed over a contact in the contact list. Miranda is free of advertising and free of charge.

Miranda attracts people who like to tweak their software because of its flexible nature. An advanced user may wish to dig deeper into the Miranda IM database files with one of the available database plugins.

7.3.2 Gaim

(<http://gaim.sourceforge.net>)

Gaim is the real all-in-one pro. It is a multi-protocol IM client for Linux, BSD, MacOS X, and Windows. And, it enjoys compatibility with AIM, ICQ (Oscar protocol), MSN Messenger, Yahoo!, IRC, Jabber, and many more.

Gaim users are given the facility to log in to multiple accounts on multiple IM networks simultaneously. Therefore, a user may be chatting to a friend on MSN Messenger, and be talking to a friend on Yahoo! Messenger at the same time.

Besides support for features such as file transfer, away messages, and typing notification, it provides many unique features, such as Buddy Pounces which give the ability to notify the user. It also comes with plugins such as ones for spell checking, tabbed conversations, and more.

Gaim integrates well with GNOME 2 and KDE 3.1's system tray, as well as with Windows' system tray. Gaim is under constant development, and releases are frequent.



Gaim in action

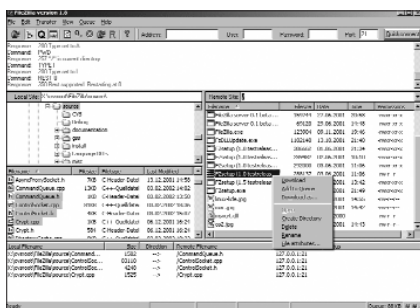
7.4 FTP Clients

7.4.1 FileZilla

(<http://filezilla.sourceforge.net>)

FileZilla is a really powerful software. It is designed for Windows with support for FTP, SFTP, and FTPS (secure FTP i.e. FTP over SSL/TLS). Some of the standout features are the site manager and the message log.

The site manager is like a database of FTP Web sites. It allows the user to create a list of FTP sites. For each Web site it also maintains their connection data: the port number and the protocol to use, and whether to use anonymous or normal login.



Copying files in FileZilla

The message log displays the commands sent by FileZilla and the remote server's responses (for the interested, this feature lets you keep track of the communication between the client and the server). It is placed along the top of the window.

The file and folder view are displayed under the message log. It provides a graphical interface for FTP. Users can navigate through folders, and view and alter their contents. This facility is extended to both local and remote machines. The tool for this is similar to Windows Explorer.

The transfer queue shows the real-time status of each request / transferring file. The queue is displayed along the bottom of the program window. FileZilla is available at http://sourceforge.net/project/showfiles.php?group_id=21558

7.4.2 gFTP (<http://gftp.seul.org>)

gFTP is a multithreaded FTP client, that is, it allows simultaneous downloads from multiple sites. It has been designed for Linux; however, it can also be used on Windows and Mac OS X.

For the user interface, it has two options: a GUI and a command-line interface. It supports almost all prevalent file transfer protocols.

The layout is double-paned. On the left is the local file system and on the right, the remote file system. Immediately below the panes, the transfer queue shows the real-time status of each file transfer (queued or active). Thereafter, there is a message log, which displays the text commands and responses between gFTP and the remote server.

How do I install gFTP?

To compile gFTP, extract the files from the distribution with “`tar -zxvf gftp-<version>.tar.gz`” Then, go to the `gftp-<version>` directory and type in

```
./configure
Make
```

The “configure” script will generate a Makefile for your machine, and “Make” will compile a binary. If the compile succeeds without any errors, then the user will be required to type in:

```
make install
```

This will install the necessary files.

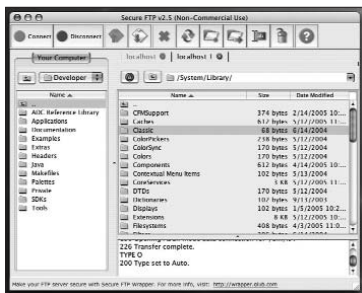
gFTP is recommended for those who wish to be in the know of everything that takes place during the transfer of files.

7.4.3 Secure FTP

<http://secureftp.glub.com>

Secure FTP provides a secure medium for transferring files. It allows for a 128-bit encrypted secure connection to be made to a FTPS server i.e. FTP over SSL.

The application comes in two versions: a graphical user interface (GUI) and a command-line interface. This makes Secure FTP a great option for both novice and advanced users.



SecureFTP on a Mac

The client is supported on Windows, Mac OS X, and any Linux distribution where the Java 2 runtime environment (version 1.4+) is present.

Installation

Installation in Windows and Mac OS X is straightforward with the only requirement being that Java 2 should be installed.

For Linux:

1. If the system does not have Java 2, it must first be downloaded and installed. (www.java.com/en/download/manual.jsp)
2. The latest version of Secure FTP can be downloaded from its Web site.
3. Since, the installer is an executable shell script, you run the download as if it were an executable, i.e.
`"sh ./<installer>.bin"`

Thereafter, the installation wizard takes over.

Using It

Windows

Choose Secure FTP 2.5 to run the version with the graphical user interface (GUI) or Secure FTP 2.5 [CLI] to run the text-based command-line interface.

Mac OS X

The GUI can be accessed from the Secure FTP 2.5 lock icon. However, to run the command-line interface, you launch the Terminal program and type “ftps” at the prompt.

*nix

For the GUI, you go to the install location and run “sh ./secureftp.sh” at the prompt. To access the command-line interface, you go to the install location and run “sh ./ftps.sh” at the prompt.

7.4.4 CyberDuck

(<http://cyberduck.ch>)

This is an FTP and SFTP client for Mac OS X that supports FTP/TLS (FTP secured over SSL/TLS). It provides the user with the ability to upload and download via drag and drop.

Cyberduck provides support for multiple languages.

7.5 Mail Clients

7.5.1 Mozilla Thunderbird

(www.mozilla.com/thunderbird)

Thunderbird is a cross-platform e-mail and news client developed by the Mozilla Foundation. It has been modelled after Mozilla Firefox. Thunderbird is not a personal information manager. Extensions allow additional functionality as and when required.

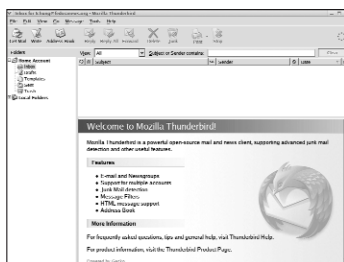
Message Management

Thunderbird manages multiple e-mail and newsgroup accounts.

And, it can also support multiple identities within accounts. Some of the features are quick search, advanced message filtering, and message grouping.

Junk Filtering

Thunderbird comes with an inbuilt spam filter, and can also understand classifications provided by filters such as SpamAssassin.



ThunderBird's startup screen

Extensions

Extensions allow the addition of features through the installation of XPInstall modules (known as XPI or zippy installation). For example, Enigmail uses OpenPGP for message encryption.

Extensions are available on the Mozilla Update site, and may be upgraded through the client. Thunderbird also has an inbuilt RSS reader.

Junk Mail Filters

Thunderbird's advanced mail filtering keeps on updating its process to more rigorous levels over a period of time. It also protects the user from phishing.

Customising Thunderbird

You can change the entire look, feel and functionality of Thunderbird through the themes and extensions available at the Mozilla Update site.

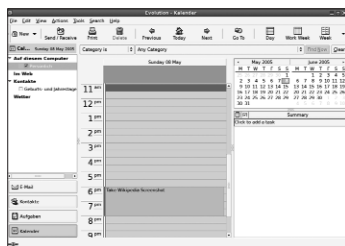
7.5.2 Novell Evolution

(www.novell.com/products/desktop/features/evolution.html)

Evolution or Novell Evolution is the official personal information manager for GNOME. It combines e-mail, calendar, address book, and task list management functions.

The user interface and functionality are similar to that of Microsoft Outlook. However, the distinguishing features are really good. They include iCalendar support and full-text indexing of all incoming mail. The e-mail filters are really powerful, and can be configured according to your preference. Then there is the “Virtual Folders” feature, which are basically saved searches that look like normal mail folders.

Evolution can be connected to a Microsoft Exchange Server using its Web interface and an Evolution add-on called Connector. The Multisync feature enables it to be synchronized with mobile phones and PDAs.



The calendar in Evolution

7.5.3 PhpGmailDrive

(<http://pgd.sourceforge.net>)

PhpGmailDrive is also known as PGD. It is written in PHP to share Gmail file attachments on the Web, and therefore is a really useful online file sharing utility.

It uses Gmail as a file hosting service and uses all of the 2.7 GB space file hosting. Once it has been installed, PGD automatically connects to the Gmail server. From there, it fetches a list of attached files and arranges them. Since PGD follows the GmailFS standard it can handle Gmail attachments uploaded by any GmailFS client.



All your Gmail attachments

Features

- It supports multiple Gmail accounts in the same instance of the program.

- It is supported by all major browsers, including Mozilla Firefox and Internet Explorer.
- The total size of the script is around 100 KB.

7.5.4 Daffodil Organizer

(www.daffodildb.com/daffodil-organizer.html)

Daffodil Organizer is a cross-platform standalone e-mail client. The only requirement is to have JVM installed. The Organizer affords good accessibility and high flexibility to customise the application.

It uses an RDBMS (a Relational Database Management System) to store all e-mails and user details. The use of the database gives flexibility in organising e-mails. Plus, the database is also encrypted.

Though Daffodil Organizer uses its parent company's database, Daffodil DB, it is also compatible with other popular RDBMS like SQL Server, MySQL, etc.

Daffodil Organizer provides the user with the feature of importing mails from Outlook Express and Outlook.

7.6 RSS Readers

7.6.1 RSS Bandit

(www.rssbandit.org)

RSS Bandit is an RSS/Atom RSS Reader. This one allows the user with the functionality of a desktop client and a Web-based RSS Reader (such as Newsgator Online), synchronizing the state of their subscribed feeds. For this, the user must have an account on Newsgator Online.



RSSBandit

The user can synchronize particular sessions of RSS Bandit using FTP or a file share utility. The data is transferred in a ZIP file that contains information about the current state of the feeds such as flagged items, read/unread messages etc. This is extremely useful for people who use RSS Bandit on different computers like from home and work.

The User Interface

The toolbar has all the operational tools. It is placed at the top of the interface window.

The list of the feeds to which the user is subscribed is on the left side. The feeds are organised into category folders created by the user. To create a new category, the user needs to right click on any existing category folder. This will bring up a context menu, with ‘New Category’ as its second option.

The Feed Details panel is on the right side and is divided into two panes. The first pane contains the list of headlines for the selected feed or feed category. Right-clicking on a headline item brings up a menu that allows the user to post a reply, flag it, copy it, etc.

The second pane contains the actual content of a selected headline. The look and feel of the reading pane can be customised by choosing a format stylesheet via the Options menu.

RSS Bandit allows the user to customise the layout of the reading pane and headlines list by going to the View menu and selecting “Reading Pane Position”.

Configuring Newsgroups

For configuring RSS Bandit, the user has to specify a public NNTP (Network News Transfer Protocol) server—for example, **news.microsoft.com**—and subscribe to newsgroups on that server.

Under the Tools menu, select the **Newsgroups > Menu** item.

This will bring up the Manage Newsgroups dialog. Here, you click on the Add News Server button to add a newsgroup server. In the field labelled News Account, you enter in a username for the news server. For the Default Identity, you select an identity to associate with the desired newsgroup postings. Then you click on the Server Settings option to enter the server connection information. In the Server Name field you enter the DNS entry (or IP address).

To display a list of all the newsgroups on the server, you click on the news server within the tree view, and then on the Refresh List button. After a brief moment, the list view will be populated with the available newsgroups.

To subscribe to a newsgroup, you either double-click the newsgroup in the list or select the newsgroup and click the Subscribe button. This will bring up the Add New Subscription dialog. Hereon, the procedure is similar to subscribing to a Feed. Once the Wizard is done, the newsgroup shows up in the list of feed subscriptions.

7.6.2 RSSOwl

(www.rssowl.org)

RSSOwl is a news aggregator for RSS and Atom News feeds. It gathers data from RSS-compliant sites. It also allows to organise, update, and store information from any compliant source. Apart from this, it also saves selected information in various formats for offline viewing and sharing.

RSSOwl generates PDF / RTF / HTML documents from any news source, and has a powerful search engine for searching for particular news feeds.

The software allows to send mail NewsTip to friends about shared areas of interest. It can also display secure news feeds from HTTPS servers.

7.7 RSS Feed Generators

7.7.1 ListGarden

(www.softwaregarden.com/products/listgarden)

ListGarden is a tool for manually creating and maintaining RSS feeds. It is an authoring tool with a browser interface, and be run locally on a computer running Windows, Mac OS X, or Linux. It can also be accessed remotely through a Web server.



ListGarden feeds

The remote access feature is useful for RSS feeds that need to be updated on a regular basis—for example, change logs, event lists etc. The program does not require the user to have any knowledge of XML or the RSS data format. The entire process of editing and addition of new items has been made very simple.

ListGarden can also act as a simple list manager with its list-maintenance functions.

The program requires the Perl language system on computers running Windows. Therefore, a version of ListGarden has been bundled together in a single file with a Perl system. Once installed, it sits as an icon in the system tray, and interacts with the user through a browser.

How To Use It

To interact with the program, you open a Web browser, and type in “<http://127.0.0.1:6555>” in the address bar. It can also be accessed by double-clicking on the tray icon.

To exit the program, you use the Quit button in the interface of ListGarden in the browser.

To create an RSS feed, you first assign a local name for the feed. This is used to create a local data file, and thereafter, you fill in the title and description of the RSS feed and the URL of the Web site it refers to.

Next, you add new items to the RSS feed. And then, you enter the destination information and publish the RSS feed.

The result of all that you have done is an XML file in RSS format. Along with it an optional companion HTML file can also be generated, and this file can be read in a browser.

The user can maintain multiple RSS feeds with ListGarden. An important and useful aspect of ListGarden is that it stores information about the RSS feed on the same machine even if the operation was done on a remote access server. This enables the user to continue from where he left off. When the user publishes an update to the RSS feed, ListGarden connects to the Web server to upload an updated copy of the XML file that makes up the RSS feed.

7.7.2 AgileRss (www.agilerss.com)

AgileRss is a desktop aggregator. It has the ability to display any RSS, ATOM, and XML news feed, and therefore, allows the user to remain updated with the preferred sources of information that support RSS.

The RSS News Ticker is headline displayer. It stays at the top of the screen. The user can customise the news ticker from the preferences panel.

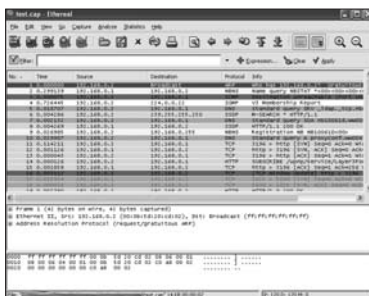
AgileRss makes life simple: it reduces the time and effort needed to check for updates, is able to subscribe to a new feed. Also, it can be configured to check for new content at user decided intervals, and retrieve the content.

7.8 Network Analysis Tools

7.7.1 Ethereal (www.ethereal.com)

Ethereal is a network packet analyser—it captures network packets and then displays that packet data in as much detail as possible. It operates on the Network layer.

The tool is used by network engineers for troubleshooting and analysis. It is also used as a test bed for software and protocol development. Ethereal runs on all popular computing platforms, including Linux and Windows.



Ethereal in action

Ethereal captures traffic from various network media apart from Ethernet. The support for a media type is determined by factors such as the operating system being used. Ethereal can open/save packets captured from/to a large number of other capture programs.

Windows Installation

The user can install directly from the Ethereal installer. However, to install the tool through the command line, certain parameters are:

- (i) /NCRC disables the CRC check
- (ii) /S runs the installer or uninstaller with default values.
- (iii) /desktopicon installation of the desktop icon, where “=yes” amounts to force installation, and “=no” to deny installation.
- (iv) /quicklaunchicon is for the installation of quick launch icon, where “=yes” and “=no” mean the same as above.
- (v) /D sets the default installation directory (\$INSTDIR).

Example: `ethereal-setup-0.10.13.exe /NCRC /S /desktopicon=yes /quicklaunchicon=no /D=C:\Program Files\Foo`

7.7.2 SNMPstat

(<http://snmpstat.sourceforge.net>)

SNMPstat is a monitoring system to monitor network devices. Since it includes HTTP service and a user directory, it is a core component of a monitoring server.

Some important components of the tool are:

- A monitoring daemon, `snmpstatd`, which maintains the status files and the accounting journals
- A system daemon, `mon_daemon`, generates dynamic Web pages, sends alarm messages, etc.
- Daily script aggregates performance data and then prepares daily, weekly and monthly reports
- WWW scripts creates HTML views and shows statistics

How It Works

System collects performance data for most objects, and stores this data. Data are recorded at a fixed interval on a regular basis. This data may be used for graphs, reports or seen in raw format.

The Interface

The System menu brings together different components of monitoring system. The ADMIN button allows to create / modify / delete users of this system.

The `snmpstat` menu and `snmpstat` status line have a few buttons, and the status line shows summary status of the system.

SNMPSTAT presents data in different table formats with a list of objects aligned along statistic bars. These can be configured and manipulated according to the preference of the network engineer.

7.9 Web Authoring

7.9.1 Nvu

(www.nvu.com)

Nvu from the stables of Mozilla.org follows the standard set by Mozilla Firefox and Mozilla Thunderbird. It is a standalone tool, and therefore provides a Web Authoring System for Linux, Windows and Macintosh users. The new Web editing environment is based on the Mozilla platform.

FTP Site Manager

Nvu provides the user with the facility to browse certain Web sites in a sidebar. These Web sites need to be specified in the Publishing Settings. The sidebar offers a variety of View options. For example, a tree view, or a one-dir-only view. It also makes it possible to filter files, that is, only HTML documents or image files too. The browsing area also shows the size of each file and the date of last modification.

Tabs

Mozilla Firefox's killer feature—the tabs—is available in Nvu, too. What this means is that the user can work on several documents at one time all within a single window. And, each document has an independent Undo/Redo stack.

CSS Editor

Nvu incorporates CaScadeS, the CSS editor add-on (originally in Mozilla Composer). It allows the user to create stylesheets and also to manage them. Besides, the user can see the style settings applied live to the document being edited.

Customizable Toolbars

The user can customise the toolbars. And, if there is a requirement for more buttons then a new toolbar can be created.

Table/Cell Resizing Rulers

On the left and top side of the opened tab, convenient table resizing rulers are provided, which will help in adjusting the

size of rows and columns in any table in the Web page being designed.

Automated Spellchecker

The integrated in-line spellchecker underlines all misspelled words as they are typed to ensure correct spelling throughout the Web page.

7.9.2 Bluefish

(<http://bluefish.openoffice.nl>)

Bluefish is a powerful editor meant for experienced Web designers and programmers. Although Bluefish supports many programming and markup languages, the focus is one editing Web sites with dynamic and interactive content. It is designed for Linux, FreeBSD, Mac OS X, OpenBSD, Solaris, and Tru64.

Features

Bluefish is a lightweight editor taking much less memory to load and exit when compared to other editors. It loads Web sites really fast, and has a highly customisable interface. In fact, the user can specify the layout of the interface. Besides, Bluefish supports a feature known as Multiple document interface (MDI), which enables it to open simultaneously documents in excess of 500!

It can handle and support remote files using prominent transport protocols such as FTP and HTTP. The number of languages that it supports is amazing. From C to HTML, PHP to Java—if it's a development or markup language, the editor will support it.

Bluefish has support for multiple encodings—it supports universal character sets such as Unicode, thereby allowing developers to target their Web site at Asian countries.

For the newbies, all HTML tags have been given dialogs that details all their attributes. The user can define a toolbar for quick access to all the frequently-used functions. Bluefish has a thumbnail creation feature. This feature makes thumbnail creation a very easy process, and extends to multiple thumbnail generation that facili-

tates making screenshot pages (i.e., a number of thumbnails are shown together as in an album).

7.10 Web Servers

A Web server is responsible for accepting HTTP requests from clients (Web browsers), and serving the requests through HTTP responses and data contents (Web pages—documents and linked objects).

7.10.1 Apache Web Server (www.apache.org)

The Apache HTTP Server Project is one of the most popular servers. The effort is to have an open-source HTTP server for most operating systems including UNIX and Windows NT. And, the result is a secure, and efficient server that provides HTTP services in sync with current HTTP standards. As a matter of fact surveys have indicated that close to 70 per cent of Web sites use Apache.

How To Run It

Apache is run as a service on Windows NT/2000/XP, or as a console application on Windows 9x/ME. On Unix, the `httpd` program is run as a daemon that executes continuously in the background.

Operating System Requirements

TCP/IP networking must be installed on the system. On Windows NT 4.0, installing Service Pack 6 is strongly recommended.

Downloading Apache for Windows

The latest versions of Apache are found at <http://httpd.apache.org/download.cgi>.

For Windows installations, the user should download the version with the `.msi` extension. This is a single Microsoft Installer file, which contains a ready-to-run version of Apache.

Installing Apache for Windows

The user needs to have Microsoft Installer 2.0 or above for the installation to work. Then all that needs to be done is to run the Apache .msi file. The installation will ask for certain things which you will configure as follows:

- (a) Network Domain—you will enter the DNS domain in which the server is or will be registered in. For example, if the server's full DNS name is server.domain.net, you type domain.net here.
- (b) Server Name—the server's full DNS name.
- (c) Administrator's e-mail Address—you enter the server administrator's or Webmaster's email address here.
- (d) For whom to install Apache: you select for All Users, on Port 80, as a Service. This is recommended if Apache is required for personal experimenting or if there is already another WWW server running on port 80.
- (e) The installation type—you select Typical for everything except the source code and libraries for module development.
- (iv) Where to install—the default path is C:\Program Files\Apache Software Foundation, under which a directory called Apache2.2 will be created by default.

Running Apache as a Console Application

Apache is sometimes easier to work from the command line as a console application. For this, you use the command "apache". Apache will execute, and will remain running until it is stopped by pressing [Ctrl] + [C].

7.10.2 Cherokee Web Server (www.Ox50.org)

Cherokee is a very fast and flexible Web Server. It has support for all the current technologies: FastCGI, PHP, and more. Along with strong security features, it also allows Virtual Hosts, on-the-fly encoding, and Apache-compatible log files.

The following requirements exist for building Cherokee:

1. The system must have some basic system programs like a sh shell, make, and a ANSI C compiler.
2. To contribute code to the Cherokee project, or to run tests on

the server, the system will require a Python interpreter installed.

3. To compile Cherokee with secure connections support, the system will require at least one of the two libraries, OpenSSL and GNUTLS.

The build process is easy, and allows the user to customise the server according to his needs.

Secure connections: TLS / SSL

The configuration script detects if there is a suitable installation of GNUTLS or OpenSSL libraries installed on the system. If it finds one of them, it will compile the server with SSL/TLS support. The user can specify which of the two files should compile:

- (a) GNU TLS library:
 `-enable-tls=gnutls`
- (b) OpenSSL:
 `-enable-tls=openssl`

To disable the SSL/TLS support, the user needs to provide the following parameter:
 `-disable-tls`

IPv6 support

Cherokee supports IPv6. It can support both the IPv4 and the IPv6 stack at the same time. There is a configuration option that will allow the user to disable the IPv6 support on run time. For this, you use:

`-disable-ipv6`

Unlike other Web server programs, Cherokee needs to be installed. The reason is that it uses libraries and extension modules that do not work if the user tries to execute it directly from the installation directory.

In order to install all the required files, just execute
make install

Once the installation is done, the user is required to restart the system, and the server is ready for use.

7.11 Wiki Engines

A wiki is a modifiable Web page. It is a form of Web site presentation that allows people to share knowledge, and to edit Web site content. The same control is extended to the people reviewing or viewing the Web site. Wikis emphasis on simplicity, speed, and collaboration has fuelled the growth of wiki communities.

7.11.1 MoinMoin

(<http://moinmoin.wikiwikiWeb.de>)

MoinMoin is an advanced, easy to use and extensible Wiki Engine. Unlike other wiki engines, MoinMoin's back end is flat files and folders, rather than a database. This makes it easy to manipulate the content in a text editor on the server. The use of flat files does have its limitations as it does not allow scalability and limits the ability of the software to relate data as a database does.

MoinMoin supports plugins and therefore, it's functionality can be substantially enhanced. An extreme example of the power of MoinMoin is that it is able to receive the output of different wiki engines, and then able to translate them into its own. MoinMoin has a desktop version as well.

Features

1. Markup

It has all the functionalities of a standard word editor with different font and heading settings. MoinMoin allows several links inter-wiki links, URLs, etc.

2. Wiki base features

The base creates backups of all page revisions. It offers simple page storage i.e. the page gets stored in a directory exactly as it was intended.

3. Navigation

MoinMoin has a very intricate indexing schemes based on

TitleIndex, WordIndex etc. The search function is also very elaborate based on different criterion.

4. Extensibility

MoinMoin can be easily extended, without changing the code.

5. Environment

Since MoinMoin has been written in Python (www.python.org), it runs on all major operating systems—Linux, Windows, Mac OS X. It does not require external support like PHP, SQL or any database. It runs with standard CGI (Apache, IIS etc.).

7.11.2 WikiWikiWeb

(www.c2.com/cgi/wiki)

Also known as WikiWiki or Wiki, this is the first ever wiki, written in Perl. As a matter of fact, the term wiki as used in association with Wikipedia came from this original wiki.

This wiki's primary focus is people, projects and patterns in Software Development. All Wiki content is work in progress. It changes as people come and go.

7.11.3 Zwiki

(www.zwiki.org)

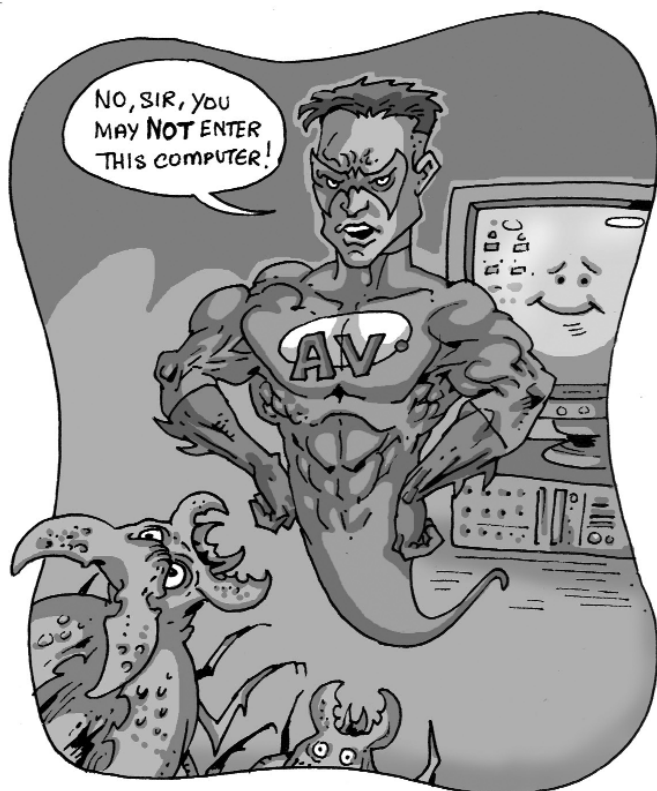
Zwiki is a powerful wiki engine. It is able to automatically generate a page hierarchy and supports a variety of text markups. It enables the user to do editing through an external tool, and provides good security features. And yes, it can include RSS Feeds, too.

7.11.4 FlexWiki

(www.flexwiki.com)

FlexWiki is a part of Microsoft's shared source initiative. It uses .NET technology and has an integrated, scripting language called WikiTalk. WikiTalk is in turn based on the SmallTalk programming language. Therefore, it is an object-oriented language, and allows users to add dynamic behaviours to their topics.

Security



We've heard from many that open source platforms and operating systems are more secure than those of the rivals. On the other hand, the free and open source tools are dismissed by the others as being "no good." What is the reality? We shall let you decide as you get to evaluate some of the best security solutions the community effort has to offer.

8.1 Anti-Virus

Why is it that the “anti” prefix has failed to gain the limelight in the domain of open source? We quote from the Web site of OpenAntiVirus (OpenAV), one of the pioneers in the field: “OpenAntiVirus is not just another virus scanner to put on a computer! OpenAntiVirus is a platform for people seriously interested in anti-virus research, network security and computer security to communicate with each other, to develop solutions for various security problems, and to develop new security technologies. “

8.1.1 The Movement Today

That statement does the job for potential white hats who intend to stop the baddies in their tracks. Unfortunately for home users, it sounds discouraging. It is true that the research is in a nascent stage, with many such tools in their alphas, but there have been some surprise discoveries. Perhaps the most active and widespread tool in use today is ClamAV, a creation of Tomasz Kojm. As the project leader, he looks back to his childhood days and explains how he had raised a clam hoping to find a big shiny pearl inside its shell. Unfortunately the clam died closed, but down a few years, Kojm had found his pearl, and named it ClamAV. The 2006 SourceForge.net Community Awards declared ClamAV the runner-up in the security arena.

While most proprietary “anti” utilities seem to have bagged one award or the other, ClamAV is a successor to the now almost-defunct OpenAV project. ClamAV was earlier an add-on to the latter, which was coded in an interpreted language, Java. The immense popularity of the OpenAV edition inspired Kojm to make his own daemon application that was free from the overheads associated with Java. The resulting version of ClamAV sported both a command-line scanner and a virus database auto-updater, unlike its predecessor.

8.1.2 The Comparison

The obvious question is, where exactly do ClamAV and its clones stand in the real world?

The efficacy of an anti-virus solution is estimated by testing against viruses in the wild and those historically called *zoo* viruses. In-the-wild ones are responsible for wreaking havoc as we read in the newspapers, while the *zoo* viruses are either outdated or are captive in the databases of virus researchers. The open source model allows for faster response time to new outbreaks. Yes, even faster than your favourite commercial anti-virus solution. But most of the open source anti-virus tools fail to detect as many *zoo* viruses and often generate false positives unlike their proprietary counterparts. This could be attributed to the fact that they arrived at a later date and missed out the early threats posed by those *zoo* viruses.

On the other hand, many people can look into the detection engines, fix bugs and provide quicker solutions. Caveat emptor! In July 2004, a test was conducted by University of Hamburg's Virus Test Center. You may have already guessed: ClamAV, celebrating its first birthday at the time, fared pathetically in the tests. It detected fewer than 50 per cent of in-the-wild and *zoo* viruses compared to the 90 per cent accuracy of commercial rivals. Though it's been a long time since such a test has been conducted, the general belief is that false positive rates and misses are more frequent in ClamAV. Coming to the point, the open source virus database has signatures of over 71,000 viruses till date, which could just be a third of the actual number. Still, it is not that bad a number, noting that many viruses that are not detected comprise *zoo* ones, which cease to cause any harm today. Moreover, as soon as a newer strain is released, the ClamAV community is one of the first few to respond.

8.1.3 The Clam package for Windows

MS Windows has long been a favourite target of viruses. While cross-platform viruses may just be lurking around, a huge percent of viruses is confined to that OS. Luckily, the Clam pack has a release for Windows, called ClamWin. ClamWin can be obtained from www.clamwin.com/content/view/18/46/

8.1.3.1 Installation and setting up

1. Run the ClamWin setup after downloading.
2. Click Start > Programs > ClamWin Antivirus > Virus Scanner.
3. You will need to have an Internet connection in order to download the virus database before you can use it.

Some features you can select by clicking the Preferences button:

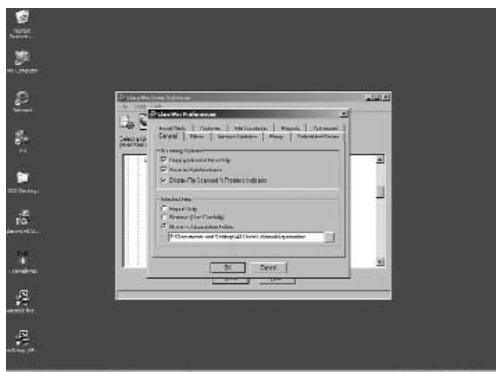
1. Delete/quarantine infected files: You can choose one of these

2. Schedule scans: Any time can be chosen

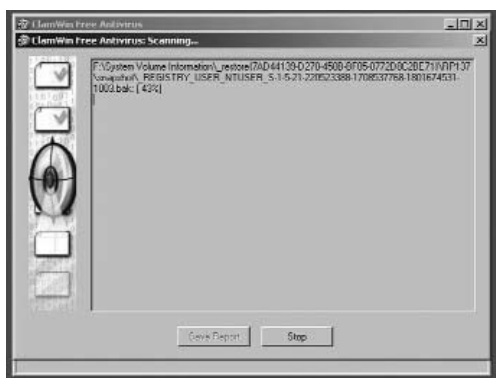
3. E-mail alert: Alert on e-mail when a new threat / infected file is found

4. Set scan frequency: How often to scan

5. File filter patterns: Describes which files to scan



ClamWin preferences



Scanning for viruses

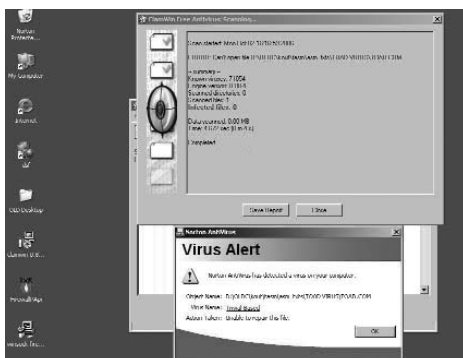
8.1.3.2 Scanning for viruses

1. The main screen shows a list of drives, and double-clicking each drive reveals the underlying folders.
2. Select as many as you like while holding the [Shift] key.
3. Click *Scan For Viruses* from the menu bar.



Virus(es) Found!

After scanning, you will be presented with a report giving out the details and actions taken. Note that any other anti-virus should be disabled while ClamWin is running, else it will bring up a “file access denied” error as alongside.



File Access Denied Error

8.1.3.3 How you can contribute

Tweaking and tuning the engines may be limited to the developers or intermediate to advanced level programmers, but any user can contribute by submitting undetected virus and spyware samples. The community welcomes Python and C++ coders. For intermediates, documentation, testing, and bug reporting are some challenges. And if you have the money and appreciate the effort, you can contribute by donating to the community!

8.1.4 The Clam Package for Linux clones

The package for Linux is called ClamAV. It can be downloaded from www.clamav.net.

8.1.4.1 Installing

A separate group called clamav is required to set up the system. Follow these commands:

1. `#tar -xvzf clamav-0.65.tar.gz` (in the directory where the source is stored)
2. `#cd clamav-0.**version**`
3. `#groupadd clamav`
4. `#useradd clamav -g clamav -c "Clam AV" -s /nonexistent`
5. `#./configure`
6. `#make`
7. `#make install`

If some error crops up, you can use various flags to disable an option, as usual. (example: `--disable-zlib-vcheck`)

8.1.4.2 Command-line scanning

For recursively scanning the home directory, issue the following command:

```
$ clamscan -recursive --include=/home
```

Again, you may set any flags as and when required. For example, the `--remove` flag permanently deletes the file. Issue a `$clamscan --help` to view all the options.

8.1.4.3 The GUI front-end

Some of us are mere novices as far as command liners are concerned, while many others still yearn for the GUI. Despair no more! Visit http://klamav.sourceforge.net/klamavwiki/index.php/Main_Page.

The eponymous KlamAV, an anti-virus manager for the KDE Desktop, awaits you. The Web site has several instructions and even demonstrates by using a step-by-step video tutorial. The Guides sec-

tion suggests several references for the same. In case you're the Gnome fan, GClamAV does the trick.



Researching viruses in GUI mode

8.1.5 On-access scanning

As compared to commercial solutions, ClamAV lacked on-access scanning, that is, the ability to scan for viruses whenever a file is opened/referenced. However, the support for Dazuko has changed things to a good extent: the clamd daemon implements on-access scanning based on the Dazuko module, available at <http://dazuko.org/>. Clamuko is a special thread in clamd that communicates with Dazuko. The latter can be installed without recompiling the kernel, in the form of a module. If you aren't already laughing at the ludicrous names, you may use www.clamav.net/doc/0.80/html/node18.html as a guide to proceed.

For Windows users, Clam Real-time (<http://sourceforge.net/projects/clamrt>) offers a workable solution. We shall discuss another such software in the anti-spyware section.

8.1.6 Mail Scanners and other add-on utilities

- ClamMail, a POP3 email proxy for Windows, works with the underlying ClamAV anti-virus engine. It shields one from viruses transferred via e-mail. It is compatible with Outlook, Thunderbird, Eudora, and other mail clients that use the POP3 protocol.
- remoteClam is a Windows-Service. It allows remote activation of virus scans with ClamAV.
- PHP ClamAV Lib is a PHP extension allowing you to incorporate virus-scanning features in PHP scripts. It uses the ClamAV API (libclamav) for virus scanning and supports two functions as of now, one for file scanning and the other for buffer scanning.

There is a popular myth that anti-virus companies hire virus writers in order to stay in business. The issue of whether virus writers themselves prepare anti-virus solutions for personal profit is open to debate. It is also worth noting that the open source community derives no such gains and might just break this myth in the days to come. If you wish to be one of the anti-virus community zealots, then the best way to start is by contributing newly detected virus samples to the cause.

8.2 Anti-Spyware

As you may already know, spyware is a broad class of programs that maliciously takes control of a computer, sometimes partially, without alerting the owner or user. It eavesdrops, collecting vital information from the computer such as credit card numbers and passwords, and often is a source of adware, occasionally throwing a pop-up banner. These might track the sites you've visited and cookies exchanged, and even transmit data across the Internet. Let's explore some of the ways of obliterating these nasties!

8.2.1 Windows

While you may go gaga over the motley collection of freeware anti-spyware software available for Windows, it might be worthwhile checking out the source code of some open source tools. We'll narrow down our search to `Winpooch`

Watchdog. A quick search on sourceforge.net will give you the idea of its popularity and admirable project activity.



Downloading and Updating Databases

You can visit the project homepage at <http://winpooch.free.fr/page/home.php?lang=en&page=home> .

Winpooch is ClamWin-based, and is cited as an efficient anti-spyware and anti-Trojan package. Its strength lies in providing protection by scanning in real-time, what we earlier called on-access scanning. For the nerds, it is coded in C and extensively uses API hooking. Winpooch provides a powerful control mechanism to the user so that any suspicious activity can be tracked. You may catch a rodent trying to nibble at your Registry bits or making attempts at quaffing your Internet bandwidth. On the downside, it is limited to the 32-bit architecture and so Poochy, the lively spyware buster, will not be able to use his firearms on other maps.

8.2.1.1 How does it differ?

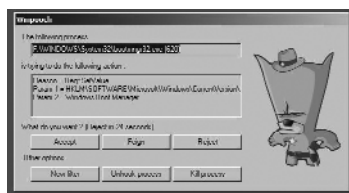
Winpooch differs from “just another anti-spyware software”: it sniffs like a watchdog. While others rely heavily on spyware signatures, often limited to a database, our candidate watches programs for suspicious actions using a set of filters. ClamWin and Winpooch can provide a perfect open source security combo. Also, solutions from Kaspersky and BitDefender AV are compatible with it. This might save you good bucks if you are crying over how Ad-Aware SE could have solved the needs of mankind with its paid “plus” package. As most security software do, Winpooch slows down your computer to some extent. However, care has been taken to forgo time-critical functions, that is, those functions that need immediate servicing from the OS and cannot wait for a prolonged period of time. This ensures that the system runs smoothly.

8.2.1.2 Installation and setting up

Start with the installer, which is a little over 1 MB. It is recommended to run Winpooch after a new OS installation, as it necessarily protects and does not destroy existing spyware.

After installation, Winpooch will offer to download the anti-virus updates. Choose Update and proceed to finish the setup. It is advisable to restart the machine. Winpooch will start on bootup,

and upon clicking the icon in the system tray, it pops up. You can start by defining your own filters. The filters help select what kind of Registry actions are allowed. The default filter is applicable to all programs and defines a set of rules.



Poochy in action!

The terminology for defining rules is as follows:

- Reason: What action the rule applies to is given here.
- Param (No.): Additional attributes / parameters required, unique to each reason
- Reactions: These specify what the required reaction should be upon recognizing a potential threat

Ask—Ask the user what to do

Accept—Accept the action of program

Feign—Tell the spyware that everything is OK but do not execute its intended malicious function

Reject—Discard the function completely

- Verbosity: Denotes whether a log file should be written, an alert generated, or to simply stay put

Let's split apart a particular rule.

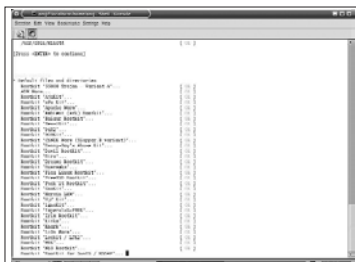
Reason	Param1	Param2	Reaction	Verbosity	Options
File::Read	*		Accept	Silent	Virus scan

What the above rule states is, for every program that is run/read, perform a virus scan silently, without unnecessarily alerting the user. You may add new rules by clicking the “Add New Rule” button.

The History section on the left toolbar provides a brief description of recent activity. It also gives out process details, reactions, and the reason for execution. A more detailed account of process-

8.2.2.1 Installing and using

After downloading the source, run the `installer.sh` script, which will do the needful. Simply typing in “`$rkhunter`” gives a list of all parameters. For instance, the `-c` flag can be used to check the whole system. The on-screen instructions are self-explanatory.



RkHunter battling rootkits

You may also want to check out the Linux Rootkit Detector: <http://sourceforge.net/projects/checkps>

8.2.3 Ad-blockers / Popup eliminators

Let's wind up by populating a few tools worth placing our money on.

- PopUp Killer: <http://sourceforge.net/projects/puk> (Windows-based)
- AKiller: <http://sourceforge.net/projects/akiller> (Windows-based)
- Mozilla Firefox with integrated popup blocker (Cross-platform)

8.3 Spam and Phishing tools

Spam has been around almost ever since we've had email addresses. To avoid those unneeded mortgage advantages you receive everyday in myriads, there are several counter-measures. If you use Web-based e-mail, chances are some filters are already protecting you. But those using the ISP's POP3 and SMTP services are at the mercy of spam. It always helps to use a collection of filters for guarding your inbox, and free software is around the block once again.

8.3.1 Spamato

The punchline "Spam will have been" prepares the stage for the show. A haven for Java folks, it is an extension for most popular e-mail clients such as Thunderbird, MS Outlook, and Mozilla Mail, and is also available as a stand-alone proxy component. It comes packed with six default filters contrary to the one or two used in many others. So instead of electing individual winners, let's see what it takes to get Spamato running. Start with www.spamato.net and look up the Downloads and Installation section.

8.3.1.1 Installation and setting up

From the many options, Mozilla Thunderbird qualifies as one of the most appreciated open source e-mail clients. The prerequisites for Spamato are the Java Runtime Environment (JRE 1.5) i.e. J2SE 5.0, downloadable from www.java.com/en/download/windows_ie.jsp, and the Thunderbird e-mail client. For MS Outlook (except Outlook 2000, which is not supported), you will also need the .NET Framework (> 1.1) which you can get from the Microsoft Web site (no validation required for Ver. 1.1, only the 22 MB effort!). For Macs and other e-mail clients, Spamatoxy is available.



Installing Spamato on Thunderbird

JRE 1.5 is indispensable for running Spamato, and so is setting up the appropriate environment variables to point to your JRE directory. If you have any previous versions, uninstall them first. To set the environment variables, go to Start > Control Panel > Performance & Maintenance > System > Advanced > Environment Variables tab. Now, in User Variables, Add/Edit and set the variables as follows:

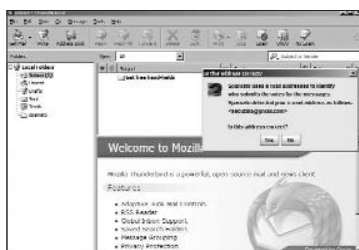
1. Name: CLASSPATH; Value: ‘.’
2. Name: PATH; value: <your JRE path> e.g. C:\Program Files\Java\jre1.5.0_06
3. Name: JAVA_HOME; value: <your JRE path>

We have just looked at an important procedure that still eludes many users who usually seek answers at the tool's forums .

The downloaded file for Thunderbird would be in the .xpi format (TB Extension). To install, go to Tools > Extensions > Install button. Now navigate to the directory where the extension is stored and click Open. Next, hit Install after the usual few seconds wait, on the next window. Restart Thunderbird.

8.3.1.2 Moving Around

There is no default toolbar for Thunderbird, but you can use Spamato's buttons by following View > Toolbars > Customize and then dragging the buttons to the toolbar. You can now proceed to check for Spam or to open the configuration menu.



The toolbar in the top right corner

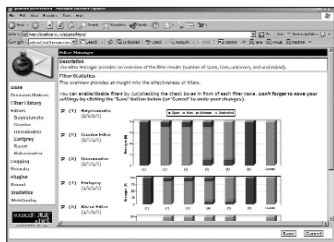
8.3.1.3 Configuring

Chances are you want total control of the system. And the best part is that Spamato can learn over time. But don't be surprised when some important mail ends up being labelled as junk and gets pushed to the Spamato folder! So make sure, while the soft-

ware learns about the spam you receive, you keep a tag on the Spamato folder that is appended to the list of folders on the left side, in Thunderbird.

To tweak Spamato, open your favourite Web browser and type in `http://localhost:8574/`. Alternatively, you can choose Tools > Spamato > Configure Spamato4Thunderbird. Here, you can view all spam-related statistics, and define how it should learn from subsequent usage. Artificial Intelligence at last!

On the configuration screen, check the boxes meant for filters that are to be used. (e.g. Bayesianato, Razor Filter). There are six such filters. Clicking the Filter History tab will allow you to manually report mails received as Spam. If you “revoke” the legitimate mails and report the Spam, it wouldn’t be long before the system gets trained in recognising legitimate mails. You can save your work by hitting Save. The Spamato Decision Maker makes the decision about future e-mails. For example, the “Average Decision Maker” averages all the filter results, and if the result is greater or equal to 0.5, then the mail is declared Spam, else *Ham*. The Decision Maker tab will give you an overview of the decision makers in use. New plugins and other learning mechanisms can also be installed by selecting the Plugins tab.



Configuring the Tomato!

As a final word, if one doesn’t want to blindly rely on the Web-based filtering mechanisms but prefers the features and convenience of the e-mail clients offering customised Spam protection, this one is a must-try. For starters, Gmail is one service that allows free POP and SMTP access that needs to be enabled from the Web site. It wouldn’t hurt to add your own smarter protection at home. If you’re interested, you can even contribute by developing your own filter.

8.3.2 Phishing in the sea

Phishing attacks involve extracting vital information from the quarry using social engineering by masquerading as a trustworthy entity. To stop those credit card numbers from leaking out, here is a list of tools worth checking out:

- Open Phishing Database project (<http://opdb.berlios.de/>): This project maintains an open database of phishing sites and provides browser utilities for using those. FireFish for Mozilla Firefox is one such.
- SpoofStick (www.spoofstick.com/): No word on whether it is open source or not, but you can take a quick peek at the sources of the Firefox extension.
- SpoofGuard (<http://crypto.stanford.edu/SpoofGuard/>): It is targeted towards both Internet Explorer and Mozilla Firefox users. A set of weights is defined which can be changed any time. These weights are assigned to different activities that add up to detect spoofing attempts. The Firefox version is available as an extension.

8.4 Firewalls

A firewall is analogous to digging a deep moat around your castle to protect yourself from foes. It can be either hardware- or software-based, and makes sure that the traffic that flows through the network complies with the local security policy. This section will lead you through how to use open source tools for setting up such barriers and secure your computer to a good extent from the Stygian realms of the Internet.

8.4.1 Affaire d'honneur

Indeed, this is the battle for honour, wherein your computer is the artefact, the town centre to be protected. We start by securing a typical Windows box.

8.4.1.1 WIPFW

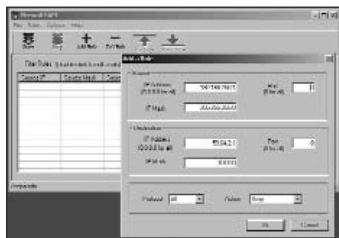
WIPFW for Windows is based on the popular IPFW1 for the

FreeBSD OS. The latter performs packet filtering and accounting that allows definition and querying of rules utilised by the kernel to make routing decisions. It consists of two sections—the firewall section that performs filtering, and the IP accounting section dealing with the monitoring of usage and traffic flows.

To install, download the installer from <http://sourceforge.net/projects/wipfw> and run the Install script. Now, you may issue an *ipfw* command with the required arguments. A GUI front-end for generating the *rc.firewall* configuration file is also available (QT Firewall). If you do choose this, don't miss a complete description of options in the nicely-formatted online documentation at <http://wipfw.sourceforge.net/doc.html>.

8.4.1.2 Firewall PAPI/FHK

Simply put, deciphering how to set rules is child's play in this firewall. Nevertheless, this could qualify as an important educational tool, especially if you want to learn how a basic firewall is coded. Hats off to the open source community.



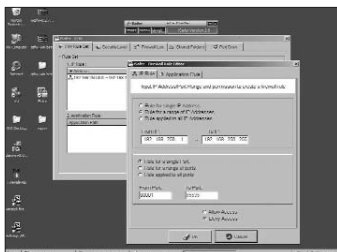
FirewallPAPI

Download link: www.txakynetwork.com/pages/downloads.htm

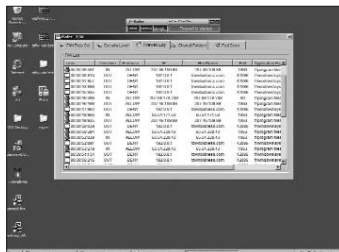
8.4.1.3 iSafer Winsock Firewall

This one is highly recommended. It not only acts as a firewall, but also protects against spyware and spam. Adding, editing and deleting rules is very simple, and the activity monitor does a good job at showing the action (DENY/ALLOW) taken for each packet. The resource site is <http://winsockfirewall.sourceforge.net>. The online user guide should see you through in almost no time.

The compact menu bar gives the option to start or stop the firewall. To configure, click the Option tab. In the F/W Rule Set tab, you may add either the IP or Application rules. Click the Add Rule



Defining rules with iSafer



The real-time mode

button and specify the range of addresses and ports for which the rule is applicable. Access can be either allowed or denied by choosing the appropriate option. Also, new rules can be created for specific programs by clicking the Application Rule tab.

On the Security Level tab, you may select from one of the three available levels of security. Shared folders can also be specified/removed from the Shared Folders tab. It supports checking all / backdoor / known ports and securing them in case they are open. After configuring, hit the Start button on the main toolbar. The real-time firewall log will intimate you about all the packet transfers across the system and will show the action taken for individual packets (ALLOW/DENY).

8.4.2 Hardening Linux

It is assumed that you know how to tackle those rpms and have championed unpacking and building of the sources before. Hereafter, individual tools will be evaluated.

8.4.2.1 Firestarter

A simple, easy-to-configure firewall, Firestarter is a very small download. You can install using the rpm or compile from source. The official Web site is <http://www.fs-security.com/>.

Setting up starts with a self-explanatory Wizard. You can later white/black list traffic, block/allow sites and ports, make security policies, define rules, and set up Internet Connection Sharing, optionally with a DHCP-enabled service for the clients.

You can clearly see all generated traffic in real-time, and its advanced kernel tuning feature provides protection against broadcasting, spoofing and flooding attacks. It supports both the 2.4 and the 2.6 kernels. Folks running an older version of Linux should get the 0.8.3 version. If a port is opened under “open ports” and closed under “close ports”, what do you think will happen? We have here an exercise for the reader!

8.4.2.2 Bastille-Linux

Referred to as the Bastille Hardening Program, it *locks down* a system and makes it tougher to get compromised. It throws a questionnaire across to the administrator and explains each topic, looking to seek the desired security settings. Later, it forms a system-wide policy and informs the admin about the fissures that have been tightened. Thus it fulfils its main goals by educating the novices and by helping them in making wise choices.

Download the rpm—just over 300 KB—from www.bastille-linux.org/running_bastille_on.htm. As usual, if you’re running an antiquated Linux version, you’ll have to do the homework before getting it to run.

8.4.2.3 Firewall Builder

www.fwbuilder.org/archives/cat_downloads.html gives you this powerful utility. You can choose the Windows- or the Linux-based version. Setting up can take a while and is definitely not for the faint-hearted! The online documentation is pretty good, though, and will see you through.

8.4.3 Heavy-duty firewalls

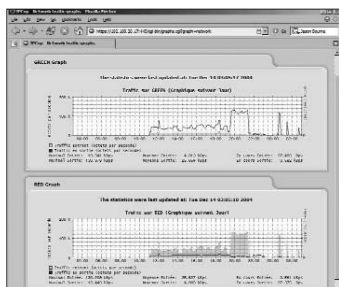
Having seen the lightweight PC firewalls, it’s time to pay due heed to the 4 x 4s. If you have a medium- to large-scale network, it makes more sense to deploy a common firewall to which the interface to the outside world is defined. For this purpose a handful of devoted open source firewalls, though gigantic in size, are suggested. They generally require a standalone machine but in many cases are satisfied with 386 machines.

8.4.3.1 IPCop firewall

At a little over 43 MB, this package is worth downloading even over dial-up! IPCop can help by

1. Securing your home network from the Internet
2. Improving performance of Web browsers (by caching frequently-visited sites)

The prerequisites are a dedicated computer (perhaps obsolete) on which it would run, an Internet interface (modem / NIC), a NIC on each desktop computer on your LAN and one for this one, some cables, and generally a switch or router through which your LAN would be connected to the IPCop firewall machine. Note that it cannot run from a live CD, and has to be installed to the hard disk, which erases all previous contents. So handle with discretion.



Traffic Monitoring with IPCop

The image file, ready to be toasted, can be obtained from www.ipcop.org, and the documentation section is exhaustive enough to give it a shot. Again, you'll be mesmerised by the spate of add-ons available at <http://firewalladdons.sourceforge.net/>.

8.4.3.2 Endian firewall

If a 100 MB transfer is no problem, this is a must-have alternative. The Endian community aims at utilising open source software to build a complete, secure and stable firewall, and is looking for geeks who can share their ideas. It's a medley of the following features:

1. A firewall that inspects each incoming and outgoing packet
2. A mail security system, wherein there is auto-protection against

viruses and spam. (This could save you a read through the first few sections of this chapter. Duh!)

3. Web security, content filtering by limiting access to questionable sites (Remember Net Nanny?)
4. Setting up SSL-encrypted tunnels with the help of OpenVPN.

Be sure to visit www.endian.it/en/community/about/ .

8.4.3.3 DMZS-Biatchux Bootable CD Distro (F.I.R.E)

This isn't a firewall, but well worth the 220 MB download. It loads off a CD and provides an environment for performing forensic analysis, incident response, data recovery, virus scanning, and vulnerability assessment. What this distro does is, it collects some of the best and most frequently-used tools, which go together. This might be the ideal OS for those who want to take up security seriously and don't know where to start. Refer to all available packages at <http://fire.dmzs.com/?section=tools> .

8.4.3.4 SmoothWall Express

[DHCP with Smoothwall Express]

The SmoothWall open source project brings home yet another firewall based on GNU/Linux. After all, Linux is often chosen for security critical applications. Under 50 MB, it's worth the toil, but unfortunately there has not been an updated official release for almost a year now. Maybe this has led to its "lost footing" at sourceforge.net. Another reason could be that many features available in the proprietary Corporate Firewall are absent in the free Express version as tabulated at www.smoothwall.net/products/comparison.gpl.php .

8.4.3.5 MOnOwall

If you're looking for an embedded firewall package that has a GUI like webmin, the tool for configuring the internals of an OS, then you've struck gold. In times when the whole world has been shifting towards XML, this tool uses PHP for configuring the system, so

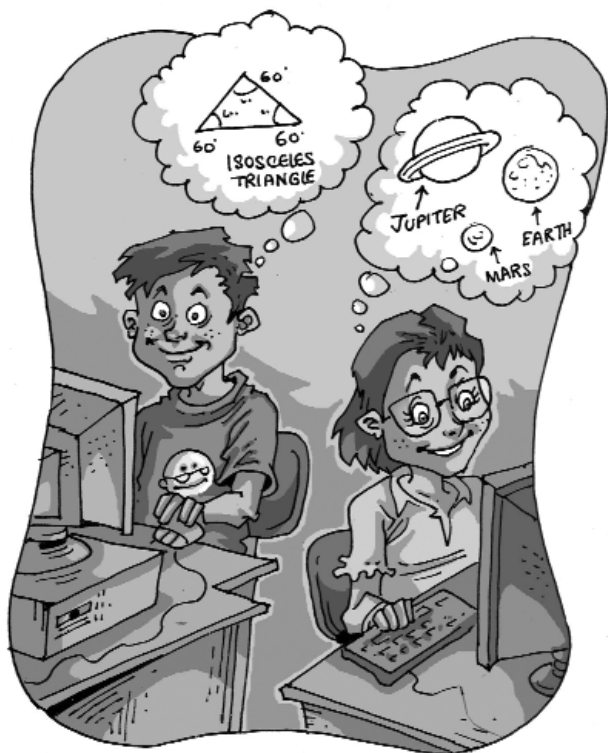
that XML may be used to store data instead of text files. The features are commendable as compared to commercial entities, and are listed at <http://m0n0.ch/wall/features.php>.

8.5 The Road Ahead...

In this chapter we have seen some of the most frequently-used, the popular, and the promising security tools that the community drive has to offer. However, these are just a handful, and by no means vouchsafe a completely secure system. It is advisable to look into tools like Ethereal, nmap, Nessus and the like, which have dramatically shaped security, as we see it today.

Kudos to the developers who have made the open source movement a success. The myth that most anti-virus gurus create those bugging pests so as to stay in business may have just been broken.

Educational Tools



This chapter introduces 10 educational open source programs. These programs demonstrate the idea that researchers and professors and such folks, while not really being part of the “open source movement” as it were, still devote a lot of time and energy towards making the world a better place! Of particular note here are the astronomy programs: children tend to have an inborn fascination for the subject, especially when it is presented in such an attractive manner.

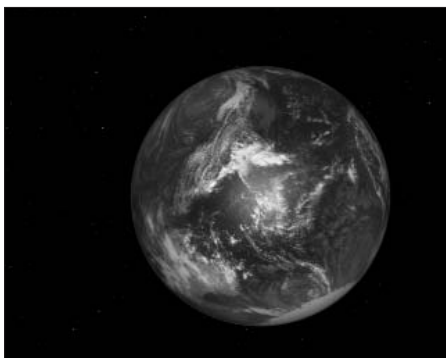
9.1 Celestia

www.shatters.net/celestia/download.html

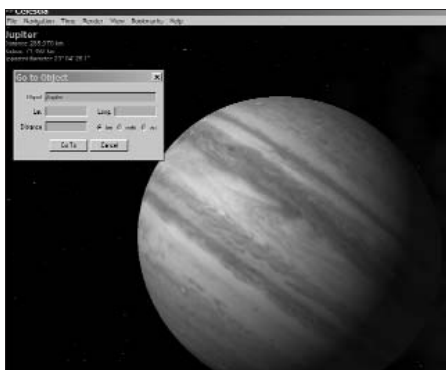
Celestia is an excellent tool—especially for children—that allows you to navigate the skies. It starts up in a window, and you'll see Earth in front of a field of stars. When you right-drag the mouse, you'll be orbiting Earth, and you might see the Moon and some familiar constellations. When you left-drag the mouse, the “camera” rotates about its centre instead of rotating around Earth. Scrolling the mouse wheel will change your distance to Earth: you can move light years away, then roll the wheel back to get back to Earth.

In the program, you can select an object to view. The default object selected is Earth. You can choose to “go to” a star, moon, galaxy, etc.

One of the cool things about Celestia is the way the “camera” zooms back and forth—it's like a movie! In fact, in the File menu, apart from just capturing screenshots, you can also capture movies.



When the program starts, you see Earth



Navigate to any object in the provided list!

The Tour Guide contains a list of some of the more interesting objects you can visit. In the Navigation menu, there's a "solar system browser" and a star browser that contains many stars. The typical Celestia experience is this—you're at Earth, you choose a star from the star browser, and you'll be zooming away, with your co-ordinates displayed on the screen, and you'll "land" at a star—if there's sufficient data about the star, you'll even be seeing what it looks like!

There are many features apart from this, including, for example, an eclipse finder. Then, the Render menu offers you such options as whether you want more or fewer stars visible, ambient light settings, and even anti-aliasing.

You're best off running the demo from the Help menu. And remember, all the documentation is there in the readme file that comes with the installation.



You can grip a celestial object and rotate it

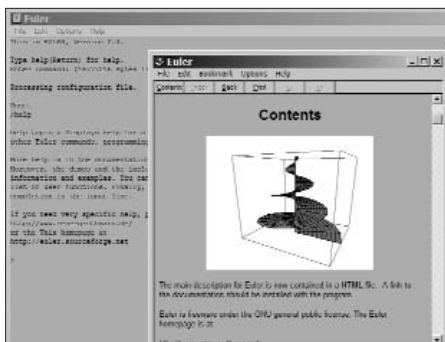
9.2 Euler

<http://mathsrv.ku-eichstaett.de/MGF/homes/grothmann/euler/Download/euler95i.exe>

Euler features several things. Amongst them is interactive evaluation of numerical expressions with real or complex values, vectors, and matrices. There are inbuilt functions that can take vectors as

the input and which are then evaluated for each element of the vector or matrix. Euler can deal with matrix functions as well. Also featured are common statistical functions and optimisation. The program can do 2D and 3D function plotting for you, and there's even an inbuilt programming language!

The interface of Euler is rather powerful: you can edit old commands and execute them again. In addition, you can add comments to every command. The notebook-like interface uses a colour scheme to distinguish between commands, comments, and output.



The help file in Euler is *very* comprehensive

So what in the real world is Euler good for? It happens to be an ideal tool for, among other things, linear algebra and eigenvalue computation; testing numerical algorithms; statistical evaluation; Monte Carlo simulations; numerical solution of differential equations; computation of polynomials; and even examination and generation of sound files!

The help file that gets installed during setup contains everything—and we mean everything—that you might want to know, and it's all extremely simple. If you do learn the inbuilt programming language you're at an advantage, but even without programming experience, it's all intuitive. For example, if you had to define a row vector a , you'd probably say

$a=[2\ 3\ 4]$

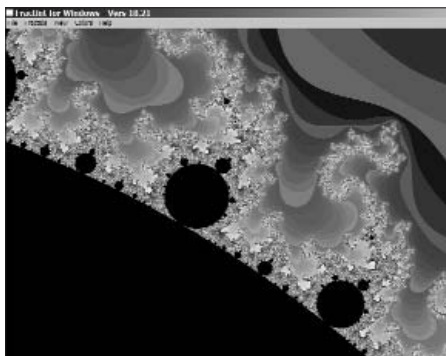
Which is exactly the way it is in Euler!

9.3 Fractint

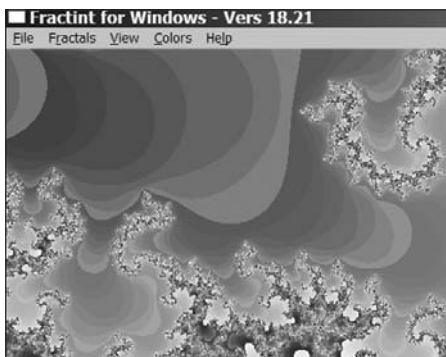
<http://spanky.triumf.ca/pub/fractals/programs/ibmpc/windows/winf1821.zip>

Unzip the winf1821.zip package and run winfract.exe. There is no installation required.

Fractint is a fractal generating program—the best one there is for personal computers. Fractals are colourful patterns that get generated from very simple mathematical formulas. The beauty is that from such simple formulas, you get incredibly complex patterns, which means that these patterns are “inherent in nature,” in a manner of speaking. The study of fractals has filled entire volumes.



Incredibly fascinating patterns...



...get even more fascinating when zoomed in!

If you haven't heard about fractals thus far, an excellent introduction is available at www.cs.wisc.edu/~ergreen/honors_thesis/fractal.html.

Using the program is dead simple: first, you choose your fractal from the menu. “Choosing a fractal” means choosing the math-

ematical formula that will be used for the calculations. The most interesting of these is the default that comes up when you start the program—the Mandelbrot fractal. Now, the idea behind exploring fractals is to zoom in (using the mouse) and pressing [Enter]. You'll see patterns the like of which you've never seen before!

The idea behind including fractals in this set of educational tools is that once you get hooked, you'll feel like exploring the mathematics behind it. The beauty of it is that the formulas are *extremely* simple. Analysing them is, of course, more advanced, and we hope that the mathematically-oriented amongst you will take out the time to explore this fascinating branch of mathematics.

Fractal theory aims at explaining a wide range of phenomena, from the shape of coastlines to the universe itself!

9.4 GCompris

http://sourceforge.net/project/showfiles.php?group_id=6865&package_id=183403&release_id=449233

GCompris is an educational software suite with numerous activities for children between two and 9. Here's a list of categories with some of the activities available in that category:

1. Computer discovery: keyboard, mouse, mouse gestures, and so on
2. Algebra: table memory, enumeration, etc.
3. Science: the canal lock, the water cycle, the submarine, ...
4. Geography: placing countries on the map
5. Reading practice

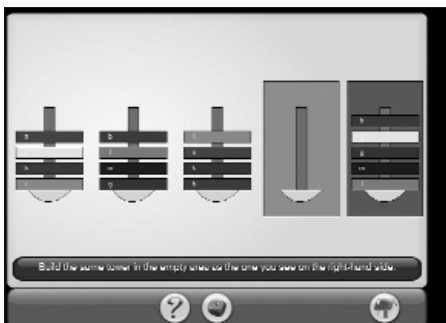
There are several others in addition to these.

The interface will appeal to kids, but there's not much help available. You won't be able to leave your kid alone to do the figuring out for himself—you'll have to figure out stuff yourself first!

What we've included here is a Windows version of GCompris; in order to promote the use of GNU/Linux, the Windows version has a limited number of activities. You can access all the activities for a fee, which sort of defeats the purpose.



A simple kiddie game in GCompris...



...and another

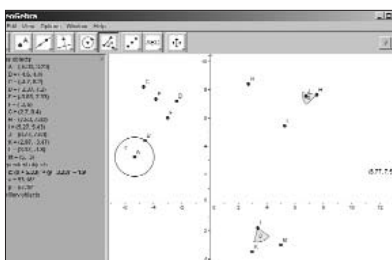
9.5 GeoGebra

www.geogebra.at/download/InstData/Windows/NoVM/geogebra_setup.exe

GeoGebra is a great mathematics software that integrates geometry, algebra, and calculus. It is a dynamic geometry system; you can easily do constructions with points, vectors, segments, lines, and conic sections, as well as functions. And on the algebra side, equations and co-ordinates can be entered directly. GeoGebra thus has the ability to deal with variables for numbers, vectors, and points.

On the calculus side, Geogebra can find derivatives and integrals of functions and offers various commands.

The central theme of GeoGebra is an expression in the algebra window that corresponds to an object in the geometry window and vice versa!



Get doodling, then get serious

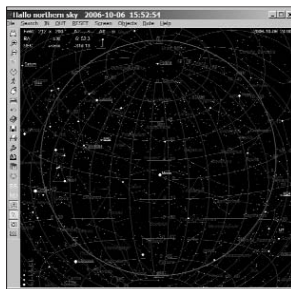
Constructions are simple enough; so is the entering of formulas. A first-timer can get used to it in no time: just click on three points in the window as shown above, and the points get defined. Then, in the formula window, just type in $A+B+C$ (where those three are the points), and you'll get the summation point D displayed in the geometry part of the window!

Help, of course, is provided in the form of a PDF file that's part of the installation, as well as comprehensive in-program help. GeoGebra is probably the ultimate freeware tool for learning and visualising basic mathematics.

9.6 Hallo Northern Sky

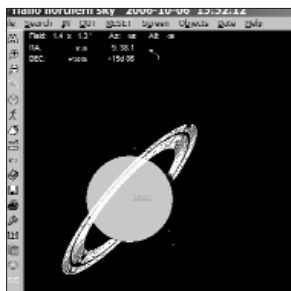
www.hnsky.org/software.htm#hnsky

“Hallo northern sky” or HNSKY is a free planetarium program for Windows. Have a go at it! You get 26,000 deep-sky objects and all stars to magnitude 12 (a measure of brightness). You’ll be able to see all the planets, the Moon, Sun, the moons of Saturn, Jupiter, Mars, Uranus and Neptune, and a few hundred asteroids and comets. The program comes with 255 small DSS (Digitized Sky Survey) deep-sky images.



HNS offers a map of *your* sky

First enter your co-ordinates—this is a simple matter of dragging the mouse to where you live—and you’re set. Then, when you’re connected to the Internet, you can download DSS files in the FITS format (Flexible Image Transfer System is the most commonly used file format in astronomy). This valuable astronomer’s resource displays astronomical images for anywhere in the sky you point and click.



As in Celestia, choose a heavenly object from a list

If you don’t own a telescope then this is the perfect way to experience the sky! And if you do own a telescope, this is the perfect tool to assist you in locating interesting objects to observe or photograph.

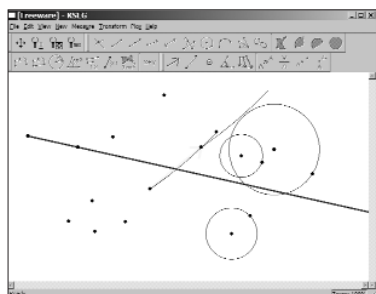
Getting around the program can be both simple and complex. It’s simple to use the “Go To” function and visit Saturn, Uranus, etc., but when you click “go left”, the program rotates left—just

like in a planetarium! If you want to go, for example, a thousand kilometres from Earth, you'll need to do some figuring out about how to use the program. Help, of course, is available.

9.7 KSEG

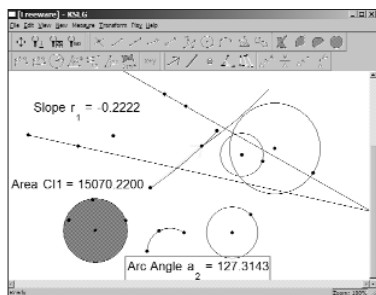
www.mit.edu/~ibaran/kseg-0.401.zip

KSEG is designed to let you easily visualise the dynamic properties of basic geometric constructions, and to make geometric exploration fast and easy. It's a great tool for a variety of people—middle-school students getting used to basic geometric shapes, high-school students getting familiar with somewhat advanced geometry, and for the rest of us who'd like to relive our experiences with geometry in school! The author of the program says, "Almost every time I sit down to play with KSEG, I discover a geometric property that I didn't know before."



KSEG is all about geometric constructions. Almost every time I sit down to play with KSEG, I discover a geometric property that I didn't know before."

The basic idea behind KSEG is that you create a dynamic construction by first placing points on the screen and then using them to construct other objects such as lines or circles. You can then drag the points you first created and watch how the construction responds to your changes.



The program calculates values for you

We don't need to explain further here, because the included

HTML help file is comprehensive, and because you're best off doodling and exploring on your own!

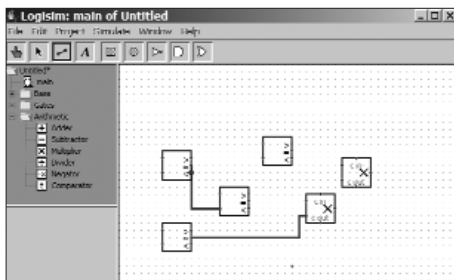
Unzip the kseg-0.401 package to any directory, then run kseg.exe. No installation is required.

All the help you'll need to run and use KSEG is available in the kseg-help-en.html file. This includes a brief and easy walkthrough, as well as a listing of more advanced features.

9.8 Logisim

http://sourceforge.net/project/showfiles.php?group_id=143273&package_id=168171&release_id=424211

Logisim is a Java application for designing and simulating logic circuits. It has a simple toolbar interface that simulates circuits as you build them, and is simple enough to facilitate learning the most basic concepts related to logic circuits. You can build larger circuits from smaller sub-circuits, and draw bundles of wires with mouse drags. Logisim can be—and is—used to design and simulate entire CPUs (for educational purposes, of course)!



A feeble attempt here at circuit design!

The interface, while not simple enough to learn for those not in the field, should be easy enough for anyone in touch with circuits—such as engineering students. You can build hierarchical circuits and wire bundles.

Two important features of Logisim are modularisation and simulation. Logisim is highly modularised: there are modules for each gate type and for each graphic output type. The program can thus be extended very easily by simply adding new modules without the need for recompiling.

As regards simulation, there are some logic circuit simulators that pass on the gates' states with a clock pulse that has nothing to do with the principle of logic—logisim, by contrast, calculates the logic flow through all gates recursively and redraws the screen at the end of all calculations.

9.9 Stellarium

www.stellarium.org

Stellarium is a wonderful, free program that tells you where the planets and constellations are at your location. With Stellarium, it's possible to see what one can see with the naked eye, binoculars or a small telescope.

As you can see from the screenshot above, the program makes you feel like you're standing on the ground, and you can see where any of the well-known celestial objects are. You can rotate the picture and move around—great if you have a telescope and need to know where the objects in the night sky are. Also great if you've just spotted an object in the night sky—relative to the moon, perhaps—and want to know what object it is.



Stellarium gives you an earthly perspective

Features include over 120,000 stars from the Hipparcos Catalogue, all the solar system's planets and their major moons, panorama

landscapes, fog, atmosphere and realistic sunsets, sunrises; eclipses for areas with documented observatories; and standard perspective and wide-angle projection modes.

9.10 TypeFaster

<http://prdownloads.sourceforge.net/typefaster/TypeFaster-v0.4.2-install.exe?download>

This is a useful program for learning touch-typing—not as slick as some paid software, but it’s more than enough to learn the basics. Touch typing is where you use a fixed finger for a particular key—and there’s a resting position for all fingers. In other words, you aren’t supposed to fumbling about all over the place to press a key—you use the “assigned” finger for a particular key, then bring it back to its resting position.

The program has lessons in stages, and it’s very simple to begin with—all you need to do is press the key highlighted on the screen, then bring your finger back to its resting position. It’s all explained in the help file. Naturally, the lessons get tougher and faster as they progress, but it starts off with something as simple as a permutation of [F], [J], and the Spacebar. ([F] and [J] are where the little tabs for resting your index fingers are located.



The key to be pressed is highlighted

Fun Stuff



Where there's a will, there's a way. That adage has been the guiding light of open source software development till date. Developers are exploring the limits of the open source movement, and it seems as if there aren't any! And what would a computing experience be like—open or closed source—if there weren't any fun stuff to do? Not that everything we've talked about thus far wasn't fun, but there's also a lot of open source software out there that you can use when you want to kick back and relax. Here's some software that's easy on the brain...

10.1 Games

Open source graphics sure aren't as snazzy as your Counter Strikes and Needs For Speed, but the games are just as fun. We take a look at some neat open source games available on the Net.

10.1.1 TORCS—The Open Racing Car Simulator

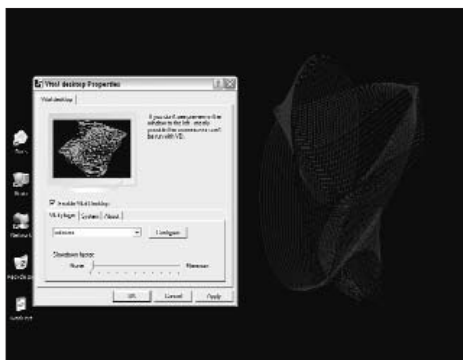
Ever wondered what it would be like to race a Formula 1 car against some stock cars? Or a Ferrari 360 against a rally car? TORCS lets you do all that, and not a lot else, really. But it's bloody good fun!

TORCS is the open source answer to most closed source racing simulators. At first glance, you could be reminded of those old touring car games. Essentially, TORCS is the open source touring car dream. The game allows you to choose from a host of cars

ranging from NASCAR to Off-Road to Buggies and even Formula 1. Create a driver profile for yourself where you can select the car you will drive in, the difficulty level, and adjust your controls.

The game allows you to select one of six race types ranging from Practice to Endurance Races. There are three types of tracks you can choose to race on—Road, Dirt and Oval (like the ones they use in NASCAR) tracks. Within these types you can choose which track you want to race on.

The game also allows you to choose your opponents. These opponents can be from racing formats that are different from the



Choose your poison

car that you have, which means that, like we mentioned before, you can race an F1 car against a Rally Championship car.

You can configure your race for length or laps, like 50 kilometres or four laps. It is advisable to practise a bit before you start a race proper, as you'll need to configure the steering sensitivity of your keyboard to suit your driving style. The game allows you to use the keyboard, steering wheel, or mouse.

The F1 car is the fastest you can choose, so if you're one of those who don't like to hang around with the rest of the pack, choose it. The game also allows you to play in split screen mode for multiplayer action right on your own computer. It's totally reminiscent of old 3D arcade games in video game parlours.



F1 vs Rally vs Road... what's the world coming to!

Graphics-wise, the game is no *NFS Most Wanted*. The physics are rather elementary, with a lot of edges and hardly any curves. The F1 car could use a lot of work. The other cars are reasonably well defined—you can make out a Rally car from a NASCAR. They each have fake advertising logos, which is pretty cool, and which could have been spread over the course of the track as well. But hey, this is open source!

Rating: 8/10

OS: Windows, Linux

Web site: <http://torcs.sourceforge.net>

10.1.2 FreeCol

FreeCol is for all the strategy buffs out there. It is basically the open source version of *Colonization* (which is essentially based on *Civilization*). FreeCol is almost a direct clone of the *Colonization* game, and is pretty good time-pass on long office days.



F1 on mud? Now that's what we call entertainment!

The player's objective in FreeCol is to colonise America. You start off with one ship (a Caravel) and two colonists. You have to find a new land and colonise it. Once you find the land, your colonists have to build a colony which you will need to grow and develop. Eventually, your colony has to be able to declare independence and survive an attack of the King's forces. Simple, no? Not quite. In the process, you will have to take into account a variety of factors like the native Americans, the other Europeans who are also busy colonising and getting the majority of people in your colony behind you before declaring independence. It all adds up to hours of interesting gameplay.

At first play the game may seem a bit slow. Turns happen at the end of every year, and if you don't have many ships, colonists, etc. you hardly get any turns: each character—be it a ship or an individual—gets a certain number of turns that it is allowed every year. However, once the game progresses and you've got some sort of a hang of it, you'll wonder why the hell they give you so many turns! The game also allows multiplayer gaming online. It really gets interesting when you open up the map and see the progress of the other Europeans. You will need a lot of Free Colonists. Spread your colonies to better your chances: you'll need to buy more ships by

which you can send more colonists, soldiers, etc. to your colonies.

Graphics-wise, the game is pretty standard. It reminds one of the early *Age of Empires* games, but without all the movement.



Welcome to Digit Land!

On the cons side, the game doesn't have any background music: the only sounds are those of money being earned.

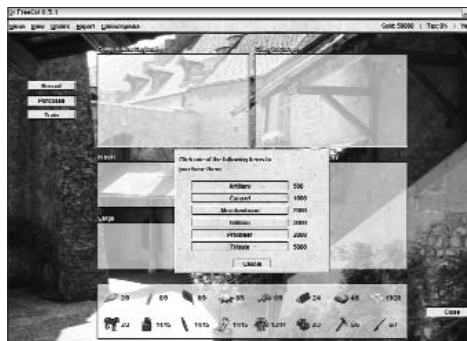
Rating: 7.5/10

OS: Windows,

Linux

Web site:

www.freecol.com



More ships = more colonists

10.1.3 Super Mario Chronicles

No, that's not a typo. Super Mario's open source avatar is Super Maryo. The all-time favourite console character makes his way into the open source world in this funky game.

The game takes you back to the old days when people said "video game" and thought "Mario." The game follows the 2D design and style and is reminiscent of the old one, but it has some quirks of its own. The maps, though they look similar, aren't exactly like the ones in the old game. So if you thought you'd find a mushroom when you hit a certain brick with your head, you may not find it at the same

The screenshot displays the StarCraft II game interface. At the top, a status bar shows 'StarCraft II' on the left and 'Game 20775 | Tactix | View: 150' on the right. The main game area is a 3D isometric view of a map with terrain, trees, and various units. A large group of units is labeled 'Trib 2', and another group is labeled 'Trib 1'. A unit is labeled 'Dip 4'. In the bottom left corner, there is a minimap showing the overall map layout. In the bottom right corner, there is a panel displaying unit/structure information, including a unit icon, the name 'StarCraft II', and the value '1000/1000'. Below this panel is a row of icons representing different units or structures.

The graphics are pretty basic

Once you die, you start from square one

A screenshot from the game 'Secret Mario Chronicles'. The top of the screen features a black status bar with the text 'Secret Mario Chronicles' on the left, 'Points: 00001240' in the center, and 'Time 00:52' on the right. The game area has a grey background. In the upper left, a Koopa is walking towards the right. In the center, a Piranha Plant is visible. On the right side, there is a Goomba enemy. The bottom of the screen shows a brick wall with several bricks, some of which are floating in the air. A small, dark, rectangular object is visible in the bottom right corner.

Maryo's got some new monsters to deal with

OS: Windows,

Linux

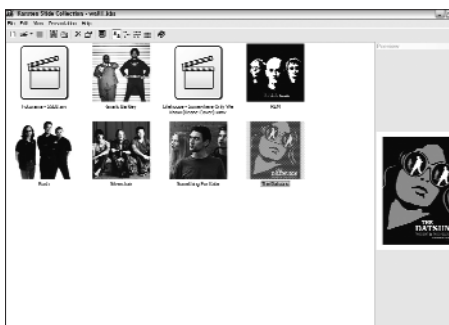
Web site:
www.secretmaryo.org

10.2 Spice Up Your Desktop

Tired of the same old wallpaper-screensaver combo? Here are some cool tools to jazz up your Desktop experience.

10.2.1 Karsten SlideShow

This is an interesting Windows-based program that uses playlists to make interesting slideshows that can be used not only as presentations, but also as wallpapers and screensavers.



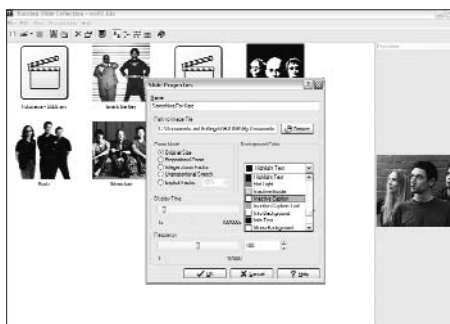
The cool thing about KSS is that you can add media files (only videos that can be read by Windows Media Player) to the slideshow. So, you can add your favourite movie clips to the playlist you create. This playlist then randomly picks up an image/media file and displays it on the window that opens for your presentation. Here is where the interesting part comes in—you can choose to keep your Desktop as the presentation window itself; so whatever images are in your playlist will get displayed on your Desktop as the wallpaper. This wallpaper will automatically change when another image is played by the program, that is, as the presentation image changes, your wallpaper will also change.

The presentation can also be used for the purpose of a screensaver. The program allows for a host of options for each individual file. You can decide the amount of zoom you want on your picture, the amount of time it should be on screen, and also the background colour. You can also adjust the frequency with which you want the file to appear in the presentation.

The program doesn't support GIFs, however. And if your video is of a non-WMP compatible format, it will not play.

OS: Windows

Web site: <http://karsten.sourceforge.net>



Options, options everywhere

10.2.2 Vital Desktop

Vital Desktop is another cool utility that, well, vitalises your desktop! The application allows you to turn your screensaver into your wallpaper.

Just right-click on your Desktop and click Configure, then select the screensaver you want to use. The screensaver will be displayed in the demo desktop. If it doesn't show here, the screensaver cannot be run with Vital Desktop. Once you've selected the screensaver, click



Vital Desktop brings the sexy back into "Sexy Wallpaper!"

Apply, and voila—animated screensavers as your wallpaper!

OS: Windows, Linux

Web site: <http://vital-desktop.sourceforge.net>

10.2.3 Daves AV Screensaver

Now here's something to "coolify" your screensaver. Daves AV

Screensaver allows you to use any media file that can be played with Windows Media Player as your screensaver. The software allows you to even use MP3s and WMA files. When audio files play, a WMP visualisation accompanies the audio track on the screen. Basically, your favourite songs and video clips can now be your screensavers!



Pick your media files by clicking Add Files

To access the menu, go to the Control Panel, click Display, and select the Screen Saver tab. In the drop-down menu, select Daves AV Screensaver. Click on the Settings button and choose which media files you would like to add to your screensaver. We tried it with different image formats such as JPEG, BMP, and PNG, and the software worked fine.

OS: Windows

Web site: <http://sourceforge.net/projects/daves-av-ss>

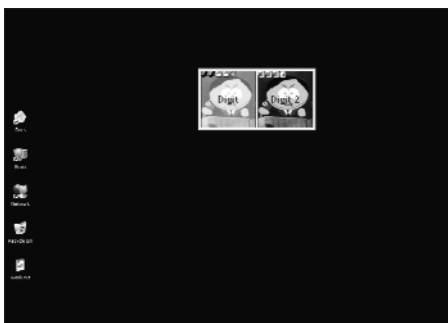
10.2.4 Virtual Dimension

Virtual Dimension is a neat desktop manager for Windows that allows you to maintain multiple virtual Desktops on your computer. Virtual Dimension allows you to use multiple applications and keep multiple windows open on more than one Desktop. If you're the kind who works with several windows at the same time, Virtual Dimension allows you to group these windows and access them as different Desktops.

For example, if you have several Internet Explorer windows open, you can group them in one Desktop and separate them from, say, your MS Word windows. All you need to do to access these windows is to select the Desktop they are on.

The program allows you to create an unlimited number of Desktops so you can put all your chat windows in one, all your browser windows in another, and so on. Just drag and drop windows from one to another! You can also customise each Desktop with different

wallpapers. For easy selection of a particular Desktop, you just need to press the hotkeys you've defined.



Group your windows in an unlimited number of desktops

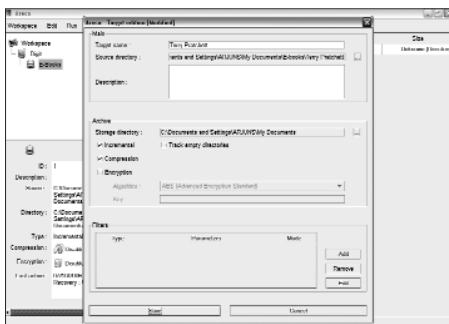
The program has a lot of easily-customisable features. For example, you can use the [Alt] + [Tab] keys to access not just the windows on your current Desktop, but all the windows on all the different Desktops. You can also customise the preview windows with images and fonts. The software allows you several options with your windows. You can have certain windows always on top. It also allows you to keep some windows partially transparent. You can save settings for each individual window that will be loaded every time you open the program.

OS: Windows

Web site: <http://virt-dimension.sourceforge.net>

10.3 System

A nifty multi-platform backup tool, Areca is a backup software that allows you to easily back up files. The application has a very simple interface that gives you access to the various program options. It automatically opens up a new workspace on startup. Within this



Archive your files by new target folders or files

workspace, you can create a number of groups for different files and folders. Each group allows you to back up various target folders or files. You can choose to encrypt your archives as well.

The program has several features including History support, which lets you view all the changes you've made to your archives. You can also do a Backup Simulation to check whether a backup is necessary for your files. Areca allows you to recover your files with a few options: for example, you can choose to recover your archives as of a specific date. You can also merge contiguous archives into one single archive. Areca provides the option of a manifest (a record) with the archive that contains information regarding the archive such as title, date, author, description, etc.

OS: Windows, Linux

Web site: <http://areca.sourceforge.net>

10.4 Other Fun Stuff

There's a whole bunch of cool open source tools out there designed to make your computing experience a whole lot more enjoyable. Here's a look at a few of them.

10.4.1 Launchy

Launchy is the open source answer to Google Desktop, except it's got a much snazzier interface. It is designed to help you find whatever program, document, image, etc. you're looking for on your computer, without having to open a ton of folders.

It allows you to configure its search for various folders and file types on your computer. By default, it will, on first install, only search for programs on your Start Menu. However, you can add as many folders and



It's convenient—and right on your desktop

file types as you like, and you can even specify these settings for each folder, that is, if you want to search for JPG files in your My Documents folder, but not in your Program Files folder, you can select that file type specifically for your My Documents folder.

When you hit [Alt] + [Spacebar] on your Desktop, the interface will open in a little bar with a text input location on your Desktop. As soon as you start typing, it will show you results for various software. You can edit the options for Launchy by right-clicking on the interface bar. You can edit the skins here as well, and change the hotkey for accessing the program.

OS: Windows

Web site: www.launchy.net

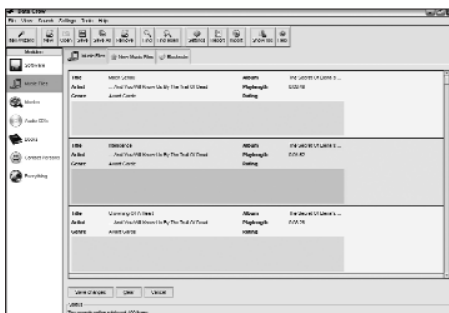
10.4.2 Data Crow

If you're the type that likes cataloguing all your collections—movies, music, books (paper and e-books)—Data Crow is great. It is a database software that retrieves information from the Web for all your files, and saves it in an effective interface for easy access.

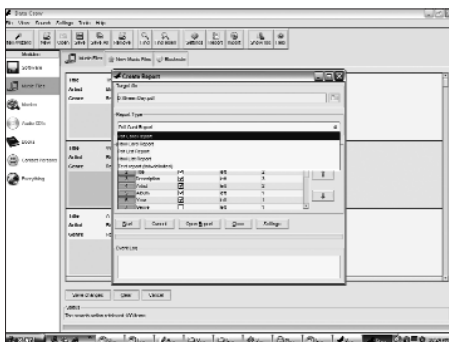
The software has a ton of cool features that allow you to store various kinds of information about your files.

Data Crow also allows you to create a report of your catalogue in the PDF, HTML, and text formats. Hit [Ctrl] + [F] and search for the files that you want a report for.

Data Crow retrieves information about your files from a variety of online sources including Amazon, IMDb and freeDB. For music files, the software retrieves information about files right from your audio CDs. For books, the software searches Amazon for book descriptions, cover art, etc. It makes a report that can be printed out.



A cool, skinnable interface and a whole bunch of features



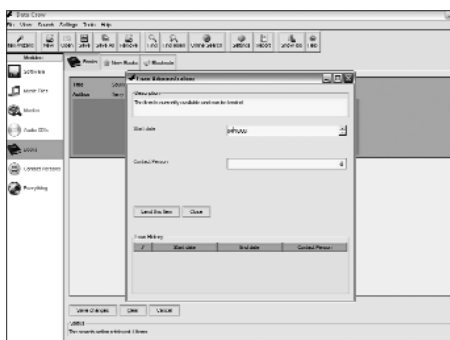
Create reports of your catalogues

The books menu can be used as an efficient library tool. You can add and view information about whom you may have lent

your books to and when. Just right-click on the Book card (book entries are stored as book cards) and select Loan Administration.

OS: Windows,
Linux

Web site: www.data-crow.net



Book Defaulters—your book defaulting days are over!

10.4.3 aTunes 1.1

Okay, so the name is ripped off Apple's baby, but aTunes packs as much, if not more of a punch than iTunes. It is a full-featured audio player and music organizer. The software reads MP3 and OGG files, and is a nice alternative to the regular Winamp and MMJs. The player essentially does everything a regular player does, with a few bonuses. Like the Mystrands support from www.musicstrands.com that retrieves information about the track you are playing and displays it on the player interface. You can check out information about the album (the year of release and the like) or about the artist, and you can even get recommendations.

If the Full View is too cumbersome for you, you can switch to a Simple View which is about the size of the Winamp player without the Playlist, and displays just the minimum information about the tracks being played. The player reads all information

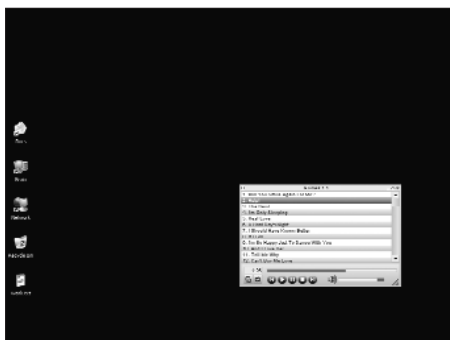


Information overload with aTunes

from the ID3 tags of songs including images that may be stored in ID3v2 tags. You can also view statistics such as track, album and artist plays for every song. Worth a try, we'd say.

OS: Windows,
Linux

Web site: [http:// atunes.sourceforge.net](http://atunes.sourceforge.net)



Simple View, when Full gets too much

10.4.4 Album List For Winamp

Here's a nifty little plugin for Winamp that displays album information from your music directories. The plugin opens in a separate window within your skin (both Classic and Modern skins supported). It displays the cover art of the album in the window itself. Essentially, it allows you to easily navigate your albums stored on your hard drive.



Album info right in your Winamp

The plugin has support for a variety of options like albums with more than one disc, and enqueueing of albums in the Winamp player.

OS: Windows

Web site: <http://albumlist.sourceforge.net>

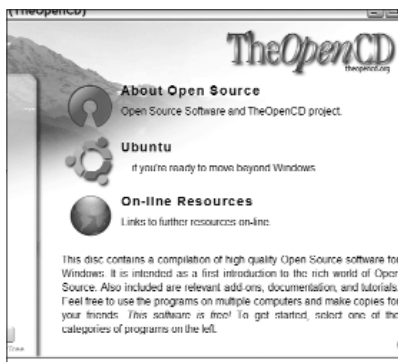
Resources



As always, we have a section here at the end of the book for stuff that doesn't fit in anywhere else—stuff that deals with what you can do online after having gone through the preceding chapters. Here, we've covered some Web sites with descriptions and why you should visit them. We didn't think it necessary to mention books and such, because when you visit any of the larger sites we've mentioned here and surf your way around, you're bound to stumble upon enough things that interest you.

www.theopencd.org

Here's something all non-open-source-converts (read: die-hard Windows addicts) will love—a CD full of useful open source software! You can either purchase the CD for a fee, or download the ISO image and burn it onto a CD that you can keep. Naturally, as new software comes in, the site (and the CD) get updated. Currently, 'the CD' is in version 3.1. We'll let the site speak for itself:



TheOpenCD project aims to introduce users of MS-Windows to the benefits of Free and Open Source Software (FOSS). We include only the highest quality programs, which have been carefully tested for stability and which we consider appropriate for a broad audience. We provide a description and screen-shots of each program, so you can get an idea of what it does before installing. All these applications install and un-install cleanly, so you can be comfortable testing them with the knowledge that they will not adversely affect your system. The programs on the disc are all distributed under an Open Source License (OSI approved), which allows you to freely use and distribute them. You may even change the programs using the source code, which we make available, and distribute your own modified versions, provided you then in turn make the source code available, and give appropriate credit to past contributors.'

If you are interested in just one or two applications, you might want to download those directly from the individual project sites. You can get the whole CD, complete with applications, tutorials and literature, by downloading it or purchasing it from CD re-sellers. The Indian CD re-seller for this CD is www.linuxbazar.com.

This site also has a minimalist forum, as well as a wiki.

The Free / Open Source Research Community

http://opensource.mit.edu/online_papers.php

Lots and lots of papers on open source. Some obscure, some great reads, some just a little interesting.

Here's a snippet from a (typical) sample:

Technology platforms, such as Microsoft Windows, are the hubs of technology industries. We develop a framework to characterize the optimal two-sided pricing strategy of a platform firm, that is, the pricing strategy towards the direct users of the platform as well as towards

firms offering applications that are complementary to the platform. We compare industry structures based on a proprietary platform (such as Windows) with those based on an open-source platform (such as Linux) and analyze the structure of competition and industry implications in terms of pricing, sales, profitability, and social welfare. We find that, when the platform is proprietary, the equilibrium prices for the platform, the applications, and the platform access fee for applications may be below marginal cost, and we characterize demand conditions that lead to this.'

You can, of course, submit your own paper.

free / opensource research community

Home: what is FOSS? resources directory online papers: add new papers: about

the latest

WELCOME TO THE FOSS 2005 CONFERENCE
CHANGES TO THE PROGRAM DURING THE CONFERENCE

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reprinted.

The FOSS 2005 program is changing. To see all the papers, click on the link below.

Author(s)	Date	Title	Type	Compressed Abstract	Affiliation
David Foray and Jean Tirole	2005	On the Economics of Open Source: The Case of Linux	paper	Our approach is based on the fact that open source software (OSS) is a public good. It is produced by a community of users who contribute to its development. The main result is that the provision of OSS is efficient when the marginal cost of production is zero. This result is derived from a general model of the provision of public goods. The model is then applied to the case of OSS. The main result is that the provision of OSS is efficient when the marginal cost of production is zero. This result is derived from a general model of the provision of public goods. The model is then applied to the case of OSS.	MIT
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www.oreilly.com/catalog/opensources/book/to.html

Open Sources: Voices from the Open Source Revolution
(First Edition January 1999)

The text of this book has been made available for free online.

A random snippet from the introduction:

'No one outside of Redmond really thinks that it is a good idea for Microsoft to dictate, to the extent they do, what a computer desktop should look like or have on it.

'Industry can have a negative impact on innovation. The Graphical Image Manipulation Program (GIMP) languished incomplete for a year at beta release 0.9. Its creators, two students at Berkeley, had left school to take jobs in industry, and left their innovation behind.'

And here is the full table of contents:

A Brief History of Hackerdom

Twenty Years of Berkeley Unix: From AT&T-Owned to Freely Redistributable

The Internet Engineering Task Force

The GNU Operating System and the Free Software Movement

Future of Cygnus Solutions: An Entrepreneur's Account

Software Engineering

The Linux Edge

Giving It Away: How Red Hat Software Stumbled Across a New Economic Model and Helped Improve an Industry

Diligence, Patience, and Humility

Open Source as a Business Strategy

The Open Source Definition

Hardware, Software, and Infoware

Freeing the Source: The Story of Mozilla

The Revenge of the Hackers

A must-read—at least in parts, if you're even remotely interested in open source!

Why Open Software?

At the end of this book, you might just be still thinking open source is some kind of fad or underground movement. If you are, here's an excellent paper for you to read, which debunks the myth that proprietary software is 'superior' or a 'safer alternative.' Of course, the paper is opinionated, because it has an agenda, but it's a good read nevertheless. Mind you, though well organised, it's long! We'd rather not present it here because of the sheer number of hyperlinks that augment the article.

Find the paper *Why Open Source Software / Free Software (OSS/FS, FLOSS, or FOSS)? Look at the Numbers!* by David Wheeler at www.dwheeler.com/oss_fs_why.html. From the page:

'This paper provides quantitative data that, in many cases, using open source software / free software (abbreviated as OSS/FS, FLOSS, or FOSS) is a reasonable or even superior approach to using their proprietary competition according to various measures. This paper's goal is to show that you should consider using OSS/FS when acquiring software. This paper examines market share, reliability, performance, scalability, security, and total cost of ownership. It also has sections on non-quantitative issues, unnecessary fears, OSS/FS on the desktop, usage reports, governments and OSS/FS, other sites providing related information, and ends with some conclusions. An appendix gives more background information about OSS/FS.'

www.osdir.com

OSDir.com's tagline is 'Stable, open source apps,' and it describes itself as 'Open Source and Linux News & Software.' There is stuff about open source in general and Linux in particular, but even if you're not interested in Linux, there's a lot here that you might be interested in.

The tabs at the top include News, Forums, Open Source Software Directory, and Screenshot Gallery.

Under the News tab, you will, naturally, find news about what's going on in the open source world.

The forum is primarily a Linux discussion board, with sections for all popular distros, but there's also a 'General' section—where we found such posts as 'Post your Desktop screenshots,' 'What's your music preference,' 'What's your favorite OS emulator,' and so on.

Under the Open Source Software Directory, you'll find, well, open source software! Categories include (where the number is the number of software under that category)

*nix (183), All Platforms (478), Embedded: Phone/Cellular (4), Handhelds (9), Linux (69), Linux Distributions (20), Mac OS 9 (1), Mac OS X (40), Operating Systems (non-Linux) (6), Programming Languages (12), and Windows (68).

Naturally, you can contribute to the site: you can submit news and reviews, and you can submit your own app for inclusion.

http://dmoz.org/Computers/Open_Source/

Another must-mention page. You'll find a lot of open source stuff at this page, and you're best off just browsing around. For example, you might have heard of an operating system called Darwin; from the page above, navigate to Operating Systems > POSIX > Darwin, and you'll find everything Darwin you might need or want.

About DMOZ itself: The Open Directory Project is also known as DMOZ, an acronym for ‘Directory Mozilla.’ The name reflects its loose association with Netscape’s Mozilla project, an open source browser initiative.



And about the ODP: The Open Directory Project is the most comprehensive human-edited directory of the Web, compiled by a large global community of volunteer editors. The ODP powers core directory services for some the most popular portals and search engines on the Web, including Google, Lycos, DirectHit, HotBot, and hundreds of others.

<http://osswin.sourceforge.net>

'The OSSwin project: Open Source for Windows!'

Here's free software heaven—again, for true-blue Windows users. Yes, every software on this page—and there are a lot of them—is downloadable as a nice .exe (no .dmh or .swa that needs to be compiled and interpreted or whatever!). There are many categories of software—from audio editing to CD writing to compression to FTP clients to text editors to... this is an absolute must-visit, if only to waste your bandwidth downloading stuff!

You'll find some cool gems at this page—including the Lynx text-only Web browser, several powerful system utilities, some great and infinitely more powerful alternatives to Notepad and WordPad, and from the top of the page, 'OSSwin now also has a separate games page. Go check it out and please promote the organization of an Open-Source-only LAN-party in your neighbourhood!'

For the scientifically-inclined...

Tim O'Reilly's Articles

<http://tim.oreilly.com/opensource/index.csp>

A ton of articles, all to do with open source. A sampling of the article titles:

Open Source Paradigm Shift
Software Licenses Don't Work
The Architecture of Participation
40 or so articles!

A sample from The Architecture of Participation:

'In the end, open source and the right to fork is a way of restoring competition to a software industry that has, for the most part, become anti-competitive through industry consolidation and the accretion of power to a few large players whose interest in maintaining the status quo becomes greater than their appetite for potentially disruptive innovation. A company that does want innovation needs to take risks. Like a surfer riding a big wave, they don't rely on containment or tight control of the environment to maintain their position, but rather, an exquisite balance and an ability to respond to rapidly changing conditions. This kind of responsiveness is hard for a large company to achieve, but not impossible, especially in the presence of the kind of competition that open source brings back to the market.'

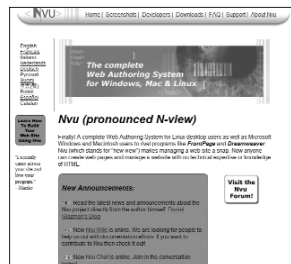
Tim O'Reilly covers a large variety of topics, and you'd do very well indeed to give this site a look.

For Web Authoring

www.nvu.com/index.php

We're mentioning this one because when we brought out our *Fast Track to Web Design*, we didn't include Nvu as a tool. Here it is, to complete that one. From the page:

'Finally! A complete Web Authoring System for Linux desktop users as well as Microsoft Windows and Macintosh users to rival programs like FrontPage and



Dreamweaver. Nvu (which stands for ‘new view’) makes managing a web site a snap. Now anyone can create web pages and manage a website with no technical expertise or knowledge of HTML.’

There’s the author’s blog, a wiki, and a chat page as well at this site. Then there’s a helpful link on how exactly to go about building a Web page using Nvu. This is sort of a complete guide—starting off with getting a domain name, and going all the way to getting your site noticed. Several links come along the way. There are helpful screenshots as well.

A very user-friendly site overall—and a must-visit if you’re thinking of building a Web site.

www.opensourcewindows.org

This one sort of completes this *Fast Track*, because it is ‘A simple list of the best free and open source software for Windows.’ Included here are several of the most popular, usual ones such as the Thunderbird e-mail client, but there are many you’ve probably never heard of—RSSOwl, Cabos for P2P file sharing, Juice—a podcasting client, and many more.

From the site:

‘Open Source Windows is a simple list of the best free and open source software for Windows. We aren’t trying to be a comprehensive listing of every open-source Windows application, instead we want to showcase the best, most important, and easiest to use. This page should be a handy reference and a useful tool for getting more people to start using free and open-source software. If you think we’re missing any great apps, please let us know.’

<http://osgaming.net/modules/news>

Open Source Gaming

The site calls itself ‘Open source for fun!’

This site, apart from hosting some open source games, seems a smorgasbord of various content—for example, there’s open source news, reviews of various open source software including games, an entire section dedicated to chess, editorials, polls, user profiles, numerous links—very open-source-ish! You’ll want to be here not just for the Windows downloads—you’ll probably want to explore the site and find yourself a few gems here and there.

DesktopLinux.com

www.desktoplinux.com

From the site, ‘DesktopLinux.com is exclusively devoted to the use of Linux as an end-user desktop operating system for personal and business purposes. This site features news, opinions, How Tos, FAQs, product previews/reviews, a lively discussion forum, and links to other web resources, all focused on using—or learning to use—Linux as a desktop operating system.

‘We believe Linux is ready now for widespread use as a desktop operating system, and we have created this website to help spread the word and accelerate the transition to a more open desktop, one that offers greater freedom and choice for both personal and business users.

‘Our commitment is to provide the highest possible concentration of quality information regarding the use of Linux on the personal and business desktop. DesktopLinux.com features desktop Linux news, articles, polls, discussion forums, and an extensive resource directory. Please check these out. We also encourage you to use the ‘submission’ functions to add more desktop Linux content for all to share. Or, email us URLs where we

can gather new information of interest to those wishing to use Linux as a desktop operating system.'

There's so much Linux stuff here, you're at risk of getting sick of the L-word! Linux discussion forums, stories, breaking news, a search feature across news and articles, Linux vs. Windows (ooh!), Linux-Watch headlines, Linux PDAs, Linux smartphones, recommended sites, a forum, polls, a buyer's guide... the list goes on!

<http://producingoss.com>

This book is for those intended to get seriously involved in the open source movement. *Producing Open Source Software* is a book about the human side of open source development. It describes how successful projects operate, the expectations of users and developers, and the culture of free software. It is available in bookstores (who'd want to do that?), and you can browse or download it at this page!

You might want to know something about the author. From oreillyn.net: Fogel co-founded Cyclic Software in 1995, a company offering commercial CVS support. In 1999 he added support for CVS anonymous read-only repository access. From 2000-2006, he managed the creation and development of Subversion, an open source version control system meant to replace CVS as the de facto standard among open source projects. He now works for Google as an Open Source Program Specialist. He also participates in various other open source projects as a module maintainer, patch contributor, and documentation writer.

You can download the PDF of the book, or you can read it online.

Writings on Open Source Hardware

www.opencollector.org/Whyfree

Did you know there was such a thing as open source hardware? Well, here's where you can find out—and read all about it!

From the page: *'Open-ness in hardware terms can have a whole range of meanings. In all the cases listed below, some hardware is open and some is not—but the trend is for open-ness to become more and more limited, restricting the freedom of designers to create or implement their own designs, and even of programmers to write the programs they wish.'*

There's an article by Richard Stallman on how hardware can be 'free,' and a ton of other articles. Go forth and educate yourself!

<http://freshmeat.net>

No resource section on open source can be complete without a mention of freshmeat, even if some of you already know about it. The site maintains the Web's largest index of Unix and cross-platform software, themes and related 'eye-candy,' and Palm OS software. Applications, preferably released under an open source license, are meticulously catalogued in their database, and links to new applications are added daily. Each entry provides a description of the software, links to download it and to obtain more information, and a history of the project's releases.

Freshmeat is the first stop for Linux users hunting for the software they need. It is continuously updated with the latest developments. In addition to providing news on new releases,



freshmeat offers a variety of original content on technical, political, and social aspects of software and programming, written by both freshmeat readers and Free Software luminaries.

The comment board attached to each page serves as a home for discussion, bug reports, and technical support. An essential resource for serious developers, freshmeat makes it possible to keep up on who's doing what, and what everyone else thinks of it.

We found the Articles section—at <http://freshmeat.net/articles>—of particular interest. Apart from the software, do give this section a look-see.

www.google.com/Top/Computers/Open_Source

Last but not least, don't forget to visit Google's open source directory! This requires no explanation, except that there are several categories, where the numbers indicate the number of sites under that category:



Advocacy (51), Articles (40), Artificial Intelligence (17), Books (5), Conferences (9), Databases (42), Directories (13), Employment (33), Hardware (21), Hosting (16), Licenses (57), News Services (22), Open Content (75), Open Standards (44), Operating Systems (106), Organisations (72), Program Contracting (2), Programming Languages (74), Search Engines (13), Software (406).